UNIVESITY OF LIFE SCIENCES
Insitute of Agricultural and Environmental Sciences

Mari-Liis Hindre

# ANALYSIS OF USAGE OF THE KOPLI AND STROOMI BEACH AREAS IN TALLINN BASED ON BEHAVIOUR MAPPING DATA.

# TALLINNA KOPLI JA STROOMI RANNA-ALADE KASUTUSE ANALÜÜS KÄITUMISKAARDISTUSE ANDMETE PÕHJAL.

Master's thesis
Curriculum of Landscape Architecture

Supervisor: lecturer Peeter Vassiljev, MSc

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*Linnapiirkonnad ei paku kodanikele piisavalt looduslikku ja tervislikku keskkonda. Sõltumata linnade laienemisest ei arene sinialade projekteerimine ja planeerimine samal kiirusel. Linnaelanikud veedavad looduses liiga vähe aega. Väliruumis käitumise kaardistamise ja tegevuste kohta pole piisavalt uuringuid. Selle väitega püütakse kirjeldada inimeste ning nende tegevuste paiknemist uuringualal. Ühiskonna jaoks keskendub see töö sinialade tähtsusele ja vajadusele ennetada terviseprobleeme planeerimisega.*

*Lõputöö uurimispiirkond, Stroomi ja Kopli rand, on väga eriline ja väärtuslik koht kogu Tallinna linnale. Selles töös kasutatud meetod on BlueHealth Behavioural Assessment Tool, lühidalt BBAT, on süstemaatiline vaatlus- ja registreerimismeetod, mis kogub andmeid inimeste käitumise ja suhtlemise kohta ruumis.*

*Andmete põhjal selgus, et jalutuskäigud on antud alal kõige sagedasemad tegevused, istumine on teisel kohal. Selle uuringu teine hüpotees oli, et sinialade atraktiivsed kohad on need piirkonnad, kus külastajad saavad tunda lähedust veega ja vee olemasolu alal on selle piirkonna külastamise peamine põhjus. Siiski, kõik kaardistatud tegevused ei ilmne rannikul, vee ääres, vaid mõned leiavad pargist sobivamad kohad.*

*Uurimispiirkonna asukoht Stroomi ja Kopli rannas ei kutsu inimesi ala läbima, kuid piirkond toimib pigem sihtpunktina, kuhu tulla eesmärgiga jalutada ja veeta aega väljas.*

*Selline järeldus näitab, et inimesed veedavad seal tavaliselt rohkem aega ja toetudes kirjanduse analüüsile võib väita, et neil on seetõttu hinnanguliselt parem tervis.*
*Lisaks annab ülevaate sellest, milline planeering pargis vajalik võiks olla ja miks külastajad sinna tulevad ning millega nad väliruumis tegelevad.*

Märksõnad: Blue Health, sinialad, roheala, käitumiskaardistus

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*Urban areas often do not offer enough natural and healthy environment to citizens. Regardless of the urban sprawl, designing and planning of blue spaces is not developing this fast. Modern citizens are spending less time in the nature. There is not enough researches about behavioural activity in outdoor spaces. For the society this work is focusing on the importance of the blue space, the need to prevent health issues with planning. The method used in this work is the BlueHealth Behavioural Assessment tool, shortly BBAT, which is a systematic observation and recording method to provide the data about people´s behaviour and interacting activities on sites.* ***The hypothesis found a proof that strolling activity is the most intensive*** *activity together with sitting which is on the second place. Another* ***hypothesis*** ***of this research was that attractive part of blue spaces are those areas where visitors can feel closeness to water and water is the main reason they visit the area.*** *Not all activities gather to the coast, but find suitable spots in the park. The hypothesis that people visit the research area because of the closeness to the water was fully not proven, therefore it is not right nor wrong. Further researches in this topic would be needed.*

*The location of the research area in Stroomi and Kopli beach is not inviting people to pass through, but the area is working more like a destination point where to come with a purpose to walk and spend time outside. In conclusion people generally are spending more time outside and therefore are at better health.*

*The method gives an overview what might be needed in the park and why visitors come and what they seek for in the outdoor space. It is suitable tool for using it in landscape architectures practice.*

Keywords: blue health, blue space, green space, behavioural mapping

# Foreword

Without my supervisor Peeter Vassiljev this work would not exist. Thanks to his calm support and guiding attitude I felt hope to get it done and start again every time. I know no one else with such a pedagogical impact.

I want to thank my closest family. My biggest supporter is my mommy. She is the one who did not accept my not-graduated-situation and pushed me forward to get things done. Extra thanks to my boyfriend/fellow who tolerated my nervousness, helped me in every possible way and took care of us during my “forever-taking” writing period. The biggest gratitude goes to my so little and loveliest Eliise. Thank You for accepting everyone else than me to push Your baby-pram when You were asleep and of course for Your long and some shortest sleeping sessions at home. I apologise for the time I sat behind the computer instead of watching your beautiful sleep. Still, You helped me finish this work with keeping me on the ground and forcing to take breaks. Thank You for giving me extra motivation and a reason to be the example for You and graduate my master’s degree. This work is for you.

# Contents

# Introduction

## Background of the Research Topic

Physical health is strongly correlated to mental health. Environmental design has potential to contribute health (Thompson 2013). Natural environments are high potential resources for public health, but not much is known about visiting them (Elliott 2015).However only physical health has earned the attention in the society for a while. Mental health therefore is quite lately raised topic and probably we do not know yet, how overwhelming the issue is in well developed countries. Probability of being healthier increases with the use of blue space (Völker *et* al 2018). The outcome of it suggest that urban areas need appropriate amount of blue spaces (Völker *et al* 2018) to predispose people to take walks and spent time outside. This work tries to find out how people use and how they visit a given research area which is also a blue space in urban area.

## Problem description

Prevention is essential part of retaining good health. Spending time outside has good impact to mental and therefore to physical health. A well planned city offers opportunities to visit outdoor spaces, to spend time in green or blue spaces, to be active. These green and blue spaces have to meet the demand and allow every user to find their own way to spend time outside.

Cities are growing bigger than never before regarding the number of population and the area, as well. This worldwide known phenomenon is called urbanisation. Regardless of urban sprawl, designing and planning of blue spaces is not developing this fast. Modern citizens are spending less time in nature than evolutionally human being has ever spent. Urban areas more often do not offer enough natural and healthy environment.

The problem of the thesis is focusing on Estonia´s issues. Most of the Tallinn´s coastline is closed for visitors. Inaccessible coast is used by harbours, private lands, etc. The accessible blue space in Stroomi and Kopli beach is very special and valuable to the whole city. Especially, because blue spaces are very good places for recreational purposes.

Habitant's quality of life is depending on the planning of the city. Outdoor space has a positive impact to health, both physical and mental. Taking Tallinn as an example of the urbanisation is not the worst option. Tallinn has numerous parks and additionally coastline which offers opportunities to create blue spaces. A carefully thought-out design will turn the area into an involving place to offer options to rest and alternation to prevent health issues.

The planning has an impact to habitants´ behaviour, their decisions and lifestyle. Poor conditions for active lifestyle do not lead to be more active. Poorly planned park with its pathways, which do not connect the main streets around the park does not invite anyone to use it as a transit corridor. A park without playgrounds or benches to sit down to rest will not be used as a place where people spend their time. The problem this thesis is trying to bring up is that unattractive park and its non-functional design is holding back the potential of green and blue space as a recreational area. To formulate the problem in other words - citizens are spending not enough time outside. To offer options for each user group, the planning of a blue space cannot be one-track design.

## Research site and history

This work is using the BlueHealth pan-Europe project´s data from Tallinn with a main goal to bring attention to well-functioning park design in blue space. The research area is located in north of Tallinn, it is Kopli and Stroomi beach area with a park (Figure 1). The site is one of three official beaches in Tallinn, with sandy part, stony part and a maintained park.

Estonian politician and publitsist Jaak Juske (2017) has written about Stroomi beach. The place is named after Bengt Fromhold Strohm in 19$^{th}$ century, when he had a barrelhouse nearby and the owner founded a straight path from there to the beach. Vacationers were not really interested to visit the beach because of poor accessibility, but local citizens found it

abnormal for a beautiful beach to be so unused. The beach area were used only for grazing around hundred cows. In 1935 Pelgulinna Beach Maintenance and Decoration Society started took care from the park. They did maintenance works, improved bathing opportunities, organised open air events and took care of the roads. They accomplished planning plan, successfully expanded the area to the south side of Baltic Cotton Fabric and constructed buildings, foundation, toiletries, even a bath bridge, cabins and swings. During a war the main beach house were canteen for German soldiers, later all the buildings burned down. After the Restoration of Independence new beach house were built. Currently there is a beach promenade and a park.

Already a century ago local citizens were interested in using Stroomi beach site for recreational purposes. The beach is nowadays renovated, but is the design of it still opportune?

Figure 1. The map of the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018) and location in North-Tallinn coast.

## Personal interest

By a coincidence I got to work in the BlueHealth project in my university. One of my lecturer, later supervisor, were looking for students who were willing to regularly visit project´s areas in Tallinn and Tartu. The aim was to map behavioural activity on these sites collaborating with few other students. I took it as a perfect summer job without any bigger ambition.

The time to choose the masterwork´s theme came up. It was not easy to find a topic for myself and I was quite lost with this difficult decision when my supervisor together with professor Mart Külvik strongly advised me to find a topic where I can use the same data I collected for BlueHealth project as I was already contributed a lot to collecting the data during the summer.

At some point my interest to the already existing data finally raised and I started to look for the suitable research questions - if and how mapping park users show important information about the site and which analyses can be presented with regularly collected behavioural data from the park area.

My personal ambition is to find important aspects for the society and for wider user groups with this work leaded me to the topic “public health”. I truly am interested in human well-being topics and how to impact residents’ mental and/or physical health with planning in urban areas. I am interested in how the design of the area impacts people´s behaviour and decisions. As I am becoming a landscape architect I want to learn what the aspects of outdoor space are or details, which invites users to the specific place, what helps citizens to make a decision to come outside and make them to plan their day with recreation in blue spaces?

For the society this work is focusing on the blue space importance, the need to prevent health issues with planning. People’s good health is with positive impact even for economy. I find this work´s method and potential outcome of it as a possible tool to use it for analysing a site

in landscape architectures practice. Finding aspects and features for fully used potentials of public space is important for environmental design to contribute health.

## The aim/goal of the work

With this research I am trying to find examples of an attractive and involving blue space design or inviting natural aspects through analysing one spectacular area in Tallinn by using behavioural activity mapping data. The method used in this work is the BlueHealth Behavioural Assessment tool, shortly BBAT, is a systematic observation and recording method to provide the data about people´s behaviour and interacting activities on sites. Each observation resulted with a map covered with dots, each one of them symbolizing one user with behavioural activity information. Based on my own experience (using BBAT method) I will make a final comment in conclusion, how useful this method would become in landscape architecture's everyday work.

About the given site in Tallinn I would like to find out the potentials of the area. I work to find out where the unused and where the overused spots are in this bordered research site. Based on this information I am going to look for the clues what makes overused spots more attractive.

I want to find out how visitors are using the park, what they find attractive, where they go, where they stop, how they use the park and based on that, I can find the potentials of the blue space.

## Research aim and questions

The design and the planning of a park must be attractive and involving. Regarding the behavioural activity, a question has been raised – **What kind of activities people engage in** (and what is the **proportion of different activities**) and **where they do it** (what is **the spatial distribution of the activities**). **Are there any general considerations for blue space**

**design that can be suggested based on the analysis of this area (attractive details and aspects)?**

In the first place, is behavioural mapping even showing used and unused potentials of the blue space and how? Questions about the suitability of this methodology help to understand this tool and how to use the information from it. Mapping behavioural activity with so many different information aspects as BBAT offers, wide variation of comparable information need to be worked through.

Objective is to learn about user's behavioural activity's pattern and its appearance of using a park. Park visitors divide into interest groups. Every visitor arrives with own plans and expectations or also with open minded mood having no intension. Theoretically BBAT method assumingly shows through the user movement, what users appreciate in the park.

Since this work is all about analysing user activity correlated to locational aspects I would also answer to a question, if this method – mapping behavioural activity – **is suitable for using in landscape architectures practice, does it gives an information about a place to create better design?** Relaying on my experience of using BBAT method, I will give my personal opinion about the suitability of this method to use it in professional planners work.

## Structure

An overview of a blue space background and its importance in urban areas will be given in the literature part of the work. The goal of literature overview is to find evidence from previous researches how people use blue spaces and also other open spaces. Then the methodology will be described together with the research area and how the data were collected.

To make a selection from the possible analysable data in the results, the data is divided into two groups. First user group shows information with users who pass the area as a transit corridor. The second group includes visitors of the area, who came there to a destination point. User profile is taken into account in some instances.

Discussion will show the weaknesses and the strengths of the area. Is this park design good enough for transit corridor group of users and/or for destination point group of users?

This work´s analyse part is leading to the point, where involving details of a blue space are and some suggestions for a well-used blue space will be presented. Counterproposals will be presented at the end of the analyses part. Based on the outcome there will be some examples of recommendations for the Stroomi and Kopli coastline. The aim of this part is to come to the solution how to renovate/change the park to be more functional.

# Literature overview

Key-words: blue health; blue space; green space, behavioural mapping

BlueHealth project is international and its approaches and methods applied in many different geographical areas and countries. The project gives better understanding between cultural similarities, environment, climate and health. By the World Health Organization principle "*the health is a state of complete, mental and social well-being*" (WHO 2020). BlueHealth project brings together international researchers to focus on water-based environments in urban areas and how blue spaces affect human health and wellbeing. (BlueHealth 2020) Blue spaces can have different values/outcomes across the world. Therefore they may have several meanings, functions and impacts on human well-being. (Gascon *et al* 2017)

Necessary is to understand and to make the difference between the terms blue space and green space. The term "green space" definition is thoroughly discussed. In a conclusion of different papers the term "green space" has no complex definition (Taylor 2017). However there are two suggested interpretations of this term to provide functional meaning. First, the term "green space" refers to a concept of natural areas in general along with bodies of water or areas of vegetation in a landscape, like forest and wilderness, but also urban greenery with trees, parks, backyards and even farmlands or coastal areas. This refers to a concept of nature and natural areas and can be understood as a synonym of nature and antonym of urbanization. The second explanation of green space describes urban vegetation like parks, gardens, urban forests and farms. By leaving out landscape objects which include water the second interpretation relates more to a vegetated variant of green space (aka open space) (Taylor 2017).

Based on previous interpretations "blue space" is slightly understood as a part of any open vegetated space. On other hand the term "green space" does not exclude neither water surfaces nor water elements in space (Völker 2011). The same author defines in another paper (Völker *et al* 2016) the term "blue space" as an all accessible water surface in nature and in urban areas. They are basically divided into four: natural water bodies connected to the ocean, flowing inland water bodies, stagnant inland water bodies, and fourth are urban

blue elements. Artificial water bodies' categorisation is depending on their appearance (Völker et al 2016). Therefore the term "blue space" summarizes all water surfaces, water elements and bodies, technical and natural water objects and all visible surface waters as well as "green space" is an analogy to describe urban areas covered with vegetation and not a sub-category of it (Völker 2011).

Environmental sciences are starting to understand salutogenic* environments (Thompson 2013) and their support to healthy lifestyles have more everlasting and wider effect. Open spaces' good influence on health and well-being makes it urgent to consider the access to health supportive environments. Population´s social and economic different positions make accessibility to salutogenic environments unequal and often poorer people have lack of opportunities for a healthy lifestyle. If establishing the major features of the environment that create pleasing physical space and proves that it activates habitats to spend time outdoors then equal access to that kind of environment is fundamental to engender sustainable physical and mental health care systems. (Thompson 2013)

**Salutogenic – The word salutogenesis comes from Latin "salus" – health and the Greek "genesis" – origin (Antonovsky, wikipeedia https://en.wikipedia.org/wiki/Salutogenesis#cite_note-Antonovsky1987-2)*

Considering users activities identifies gaps in understanding the well conceptualized environment. Users' interactions clarify the importance of collecting the knowledge in ways to practice it in design. (Thompson 2013) Literature overview tries to bring out what people are doing in outdoor spaces and which activities are most attractive ones. According to findings hypothesis how people behave in blue spaces can be done.

## Research on blue space in urban context

Research papers are mainly describing their main goal as to create better understanding how to improve future urban planning and how to enter achieved knowledge to environmental policy and how to confute the importance of well-designed spaces in urban areas (Garrett 2018). Findings suggest that waterfronts and other aquatic settings with public access and also with visibility to blue space offer to the community a change to promote and protect

their public health (Garrett 2018). Water existence has always been one of the most important aspects of evolving human settlements. Common fact is that water is vital for life. Blue space environments have played historical roles in evolution along with locations of cities near natural fresh water surfaces. Living next to a water made civilizations existence possible. It gave to a settlement´s habitants a chance to grow food and find a solution for transportation. (Muscato 2016; BlueHealth 2020) At a later time artificial water bodies' positive effects were also known for antique time people. They added artificial pools and fountains to their cities. Water was in focus also in the creation of first parks in urban areas. (Muscato 2016) Availability to open green and blue areas in cities was high until the industrialisation period. Nature and open spaces in cities have become very important, although urban sprawl and increasing population gives it a challenge. Living in a city can cause new threats to public health and well-being. (Völker *et al* 2016) Living close to the coast and having views of coastal area is epidemiologically proved to have positive effects to people by being generally healthier and those positive effects may be even better than similar results of green space accessibility. (Wheeler 2012) Not enough is known about similar effects to health in coastal areas compared to other blue spaces like rives, canal and lakes etc. (Grellier 2017).

Most of the studies in the field of investigation the outdoor blue space exposure, health and well-being have been conducted since last decade. Blue spaces and the impact to human health is much needed methodological improvement and standardized exposure with comparison across cultures and climates. (Gascon *et al* 2017) For example behavioural mapping, which is used in BlueaHealth project as well, is one of the increasing observation tools in landscape architecture and other neighbouring fields (Unt 2013). Collecting the data of park use is important to measure the contribution of open spaces to health (Cohen *et al* 2014). The results of most of the papers brings out are positive effects of outdoor blue spaces, their good effect to mental health and promotion to physical activities (Gascon *et al* 2017). There is a relation between mental health and the regular and frequent use of urban blue spaces. Publicly accessible blue spaces enhances mental health (Völker *et al* 2018). People are significantly and substantially happier when being in natural environment than in urban areas (Mackerron 2013). However more experiments and studies can give us a better understanding of outdoor blue spaces impact to human mental health. (Gascon *et al* 2017) Many researchers are using questionnaires as popular methodology to find out people's self-esteem position about blue spaces and connection with health and well-being. A survey from

Hong Kong proved that having only a view to the blue space was related with good self-reported health (Garrett 2018).

## Impact of environment to the health

Many illnesses are not directly connected with the time spent outdoors (Thompson 2013) but more about the physical activity. A survey (Saint-Maurice 2020) from the medical field evaluated at least 40 years old people´s daily steps and walking speed during 7 days. The paper found out the correlation between the number of steps and participants´ mortality in 10 years. Shortly there was no big difference between those participants who took 8000-12 000 steps per day or more than 12 000 steps. Significantly higher mortality percent was among participants who took only up to 4000 steps per day. Similar results were with physical activity relation to cardiovascular disease and cancer mortality. For this work is very important to bring out that there was no relation between walking speed and mortality. This survey assures the habit of moving more on foot helps to improve health and lengthens life and determinative is number of steps and not the speed. (Saint-Maurice 2020) Necessary goal for planners is to create open spaces which encourage citizens to go outside and spaces with blue elements have higher potential to be more attractive than only green spaces.

The results support the concept of the health enhancing impact of natural environments and blue space. Accordingly the perspective of a blue space can carry a strategic role in urban planning and urban open place management to support health in urban areas. (Völker *et al* 2018) Wild urban areas can be an attractive outdoor environment and all the areas in cities do not need to be built out, designed, and regulated. (Unt 2013) Wild natural spots can improve the ecosystem and bring balance between urban and natural areas. Small changes in derelict places can have a positive or negative influence on user behaviour and it is not depending on change´s scale and expense. (Unt 2013)

## Hypothesis based on literature

Hypothesis are made through observer's experience. It means that collecting the data in research area took place before the start of writing this work. Relay on literature and observation experience there are formatted two theoretical views.

Based on the literature research can be said that there are very few papers offering a chance to compare existing data with behavioural mapping outcome. Still, based on overall literature the hypothesis is that park visitors are most often walking to the parks and in or around the green or blue area. Due to the formulation used in BBAT method it is named in this work as *strolling* or *walking quickly to the transport* activities. **Hypothetically *strolling* activity might be the most popular and most often practiced activity in Stroomi and Kopli beach areas.**

As mentioned earlier in this chapter having a view is related with positive self-reported health and nice or opened views are highly valued in society. Therefore the second **hypothesis of this research is that attractive part of blue spaces are those areas where visitors can feel closeness with water and water is the main reason they visit the area.** There is a possibility that park visitors in Stroomi and Kopli beach areas come for the view to the sea as it might be the top attractive reason to visit the full place.

# Method description

## BlueHealth2020

*What is the project BlueHealth and which questions have been raised?*

This paper is part of the BlueHealth project by using the data collected for it and analysing in results. The base of this research is standing on the fact that health is correlated with person´s time spent outside. The environment can invite us or discourage us from spending time in fresh air. The aim of the paper is to find out if the given area is attractive enough or could it be even more involving for its users.

The BlueHealth Behavioural Assessment Tool (BBAT) was used in Tallinn and Tartu for systematic observation and recording how people behave and interact in observable sites. Bluehealth´s surveys took place in 14 European countries with a range of climatic, geographic and cultural contexts. Surveys included sites on the coastlines of Atlantic, the North Sea, the Mediterranean, the Black Sea and the Baltic Sea and several landlocked water bodies including lakes and rivers (Grellier 2017).

## BBAT method

*Description of the method with resources:*

The BlueHealth Behavioural Assessment Tool (BBAT), developed specifically for the BlueHealth project is used to capture people´s activities at a particular blue space (Bell, Vassiljev 2017; BlueHealth 2020). The software that was used to collect and map the data is geographical information system QGIS (version 2.8.17) and was used on a portable device (Surface Pro 4) on site at the time of observations. BBAT has been developed to systematically observe and record behaviour and interaction of people in different sites at relevant community-level intervention sites. This method has been found to be more

informative and more efficient for collecting data and offers more opportunities for analysis compared to paper-based data collecting.

During systematic on-site observations seasons, date and time of the day including weather variables with considerable change in weather conditions are recorded. The exact location, type of activity and demographic characteristics of the users are mapped with BBAT method. The results of the observation will provide us the information about dissemination of the users in observed blue areas, which can be afterwards analysed by different categories such as social status, weather and time of the day to point out the differences in the usage of the area. (Bell, Vassiljev 2017; BlueHealth 2020)

The aim of BlueHealth project´s Behavioural Assessment Tool (BBAT) in this work is to systematically find out the behavioural activity of given blue space in Tallinn and the site´s functionalities through a systematic behavioural mapping. This method helps to exposure blue spaces necessity and user activities generated for specific user groups. Moreover, the aim is to quantify the role of the site and find out connections of the area in neighbourhood urban infrastructure and to bring up the importance of the specific area in everyday life and in traffic of pedestrians, cyclists and sport practitioners. With health promotion in mind, using the BlueHealth project´s BBAT method the designing in future planning will develop the outcome of urban blue spaces in Estonia as well in Europe. (Bell, Vassiljev 2017; BlueHealth 2020) This work is focusing to bring out the amplitude of blue space usage with BBAT method collected data.

*What information were mapped?*

The information collected with BBAT method can be separated in three sections. First the age and gender information in six groups 1 (0-12 years old), 2 (13-20 years old), 3 (21-59 years old), 4 (over 60 years old) women and men. Plus social interaction information: were they alone, in pairs or in a group with three or more people together.

Secondly the observer had to record the primary activity. Activity alternatives are listed in a drop-down bar like activities on foot, laying, sitting, and standing. Others are based on speed like strolling or walking which is more like rushing through the area. Another option is jogging, walking with a dog or with Nordic poles and running/jogging. The wheeled movement selection has activities like cycling, kick-scooter, rollerblading, skating, but also

using a wheelchair. The third pop-up selection list is sports and games. This list has different ballgames, sport activities, also alternatives like playing with a dog or a child playing with sand or freely, using outdoor gym or playground, even horse riding. Two last primary activity sections are linked with water. One is in the water and the other is on the water activities. First of them offers swimming, bathing, diving, snorkelling and paddling or splashing options. In the water activities count also fishing, feeding birds or fish and pond dipping. On the water activities are everything that involves special equipment like surfing, windsurfing, paddle boarding, cable pulled wakeboarding, boating, kayaking and sailing. It was allowed to choose only one primary activity.

Activities had to be marked down with checkmark and as many as needed. Options to add extra clarifying information to primary activities were resting/doing nothing, sunbathing, actively observing, listening, reading, using smartphone or talking on phone, chatting, handling a baby-pram, drinking, eating and grilling. In conclusion all kinds of thinkable passive and active positive activities are possible to choose in the behaviour data window (Figure 2).

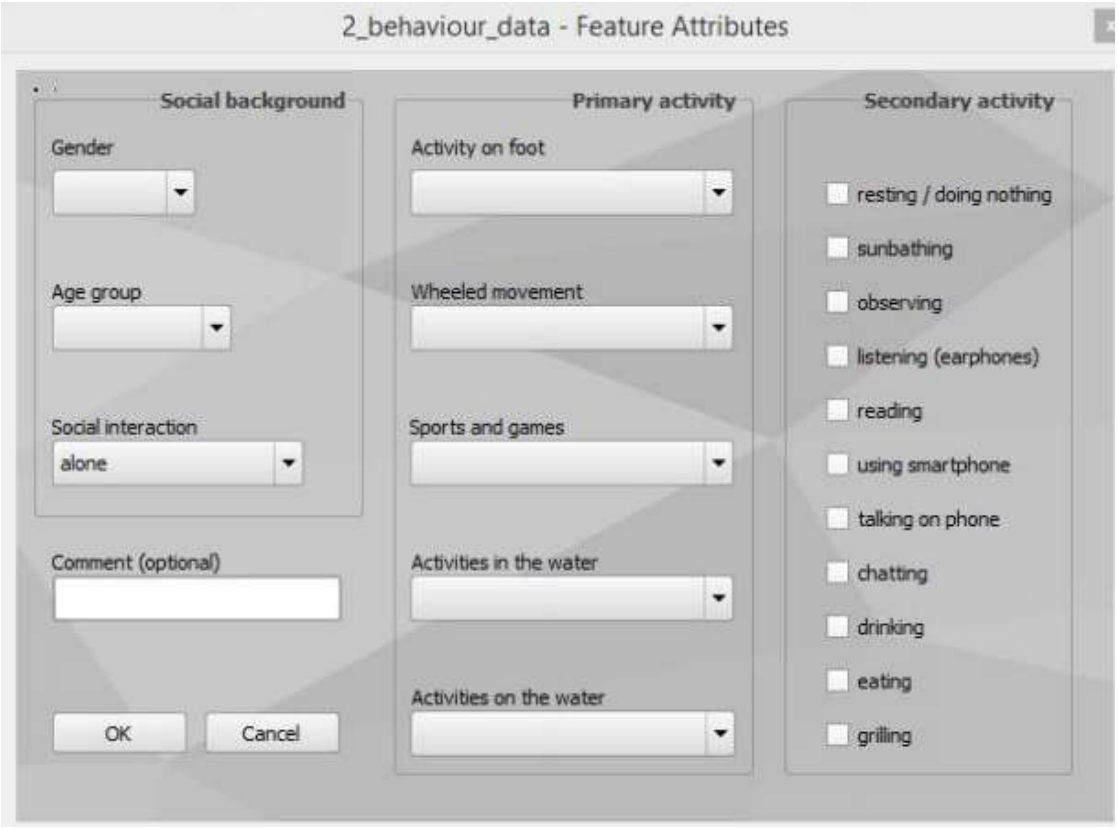

Figure 2. BBAT tool data entry from (Bell, Vassiljev 2017)

## Description of the site

*Why and how they were chosen; overall principles of the project´s sites*

Tallinn coast line of the site previously lacked facilities and attraction. The area is at the moment used for active and passive recreation. More common activities were listed previously, but still the community reported negative aspects of this area. There are issues with safety, alcohol and drug use in and around the area, reports of littering and lack of facilities. BlueHealth´s goal was to meet local needs, promote health and wellbeing and to encourage the connectedness to nature by co-designing a community space.

One of the overall principles of the given sites by the project is a place which has valued meaning in people´s memories and creates a sense of belonging with it. With a lively history of Kopli peninsula from the soviet time the site area with surrounded peninsula has a great pack of memories and connections in people's minds already before any intervention to the coastal area. As a coastal line of Tallinn, the Kopli and Stroomi beach is potentially a comfortable place for socialising and interacting and it is becoming safer within a time and a change in local cultural field and in habitants behaviour. Another important specification of the area is inclusive access to interact with both water and nature. Kopliranna part of the area offers wilder environment and an options to get close with water by climbing on stones to it´s visitors. Stroomi beach is a little bit opposite to Kopli beach with it´s long sandy beach and an organised and maintained park area. Stroomi and Kopli coastal line offers a different experience to visitors. Every user can find something for themselves, solitude or relaxation alone or with friends and family. There is space for hobbies like fishing, skating or variation of sports. Kopli and Stroomi beach in Tallinn meets perfectly all the requirements set for the project specification to the sites. The area has high potential which is yet to be realized.

## Kopliranna and Stroomi beach area in Tallinn

The mapped site is located in the North of Tallinn and is approximately 25 000 $m^2$. Admirable view over the Kopli bay invites habitants to use the location year-round. The area consist of two completely different regions. Those two areas offer contrast to each other and

create together a very versatile environment in an urban area. Stroomi and Kopli beach line with urban park area was selected site with very high potential and without any strong prestigious fame.

Kopliranna coastal line is informal beach area with stony water and wilder green space. Before the observation period there were no facilities at all except for two old red beacon lighthouses and apparently self-made swing hanging from the tree for local children. This part of the park is furthest from the city centre and from a straight access direction to the peninsula. Kopli beach in the area can be characterised by being quite private and offering a chance to spend time alone. It has been an unmanaged area with high grass and wildly growing bushes. Near the waterline old pieces of concrete blocks can be found. The open coastal line for visitors ends in Kopliranna with closed harbour area and is a dead end direction, because this part is badly connected with surrounding streets. Habitats have to take certain decision to enter or exit the site from there. On the other hand the site is with negative fame and Kopliranna area of the site was completely untended at the beginning of the observations. However with 3-4 years during the project the surroundings has improved a lot.

The larger area of the given site is called Stroomi beach. It is well maintained sandy beach where people love to take walks, go swimming and is also popular place for just sunbathing during the summertime. The beach is official swimming place with lifeguard in the summer period. Currently there is a beach house with a cafe and toilets, but the house itself is looking repulsive and needs to be renovated. On the sand sport activities like volleyball can be played on the beach. The park area in Stroomi beach part of the site is well maintained with always trimmed grass, nice benches and new asphalt to take a walk on. Park itself can be described as simple designed area with open views. Near the beach house there is a playground, outdoor gym, basketball court, table tennis and at a distance some swings for children. The maintained park area is evenly covered with picnic tables. Most of the vegetation are local species, for example there are trees like pines, birches and other popular deciduous trees and few bushes. On the sandy side the rosehip (*Rosa vosagiaca*) is growing widely by forming a barrier which is concealing sunbathers from the park area.

Stroomi beach has a better connection to the city than Kopli beach (Figure 3). The bike lane connects the park with Rocca al Mare district, running by the edge of the bay. The whole

park area is actually longer than the given observation site´s borders. The beach park starts with a parking lot and surfing school. On one direction there starts the sandy part of the beach and on the other direction there is a forest called Merimetsa with pathways running through the park. After a variation of playgrounds and pedestrian roads the given observation site starts where the beach house is. Further on the park is well connected with street structure since the forest ends shortly with the beginning of blockhouse area. The site is easily accessible with car, public transport and on foot.

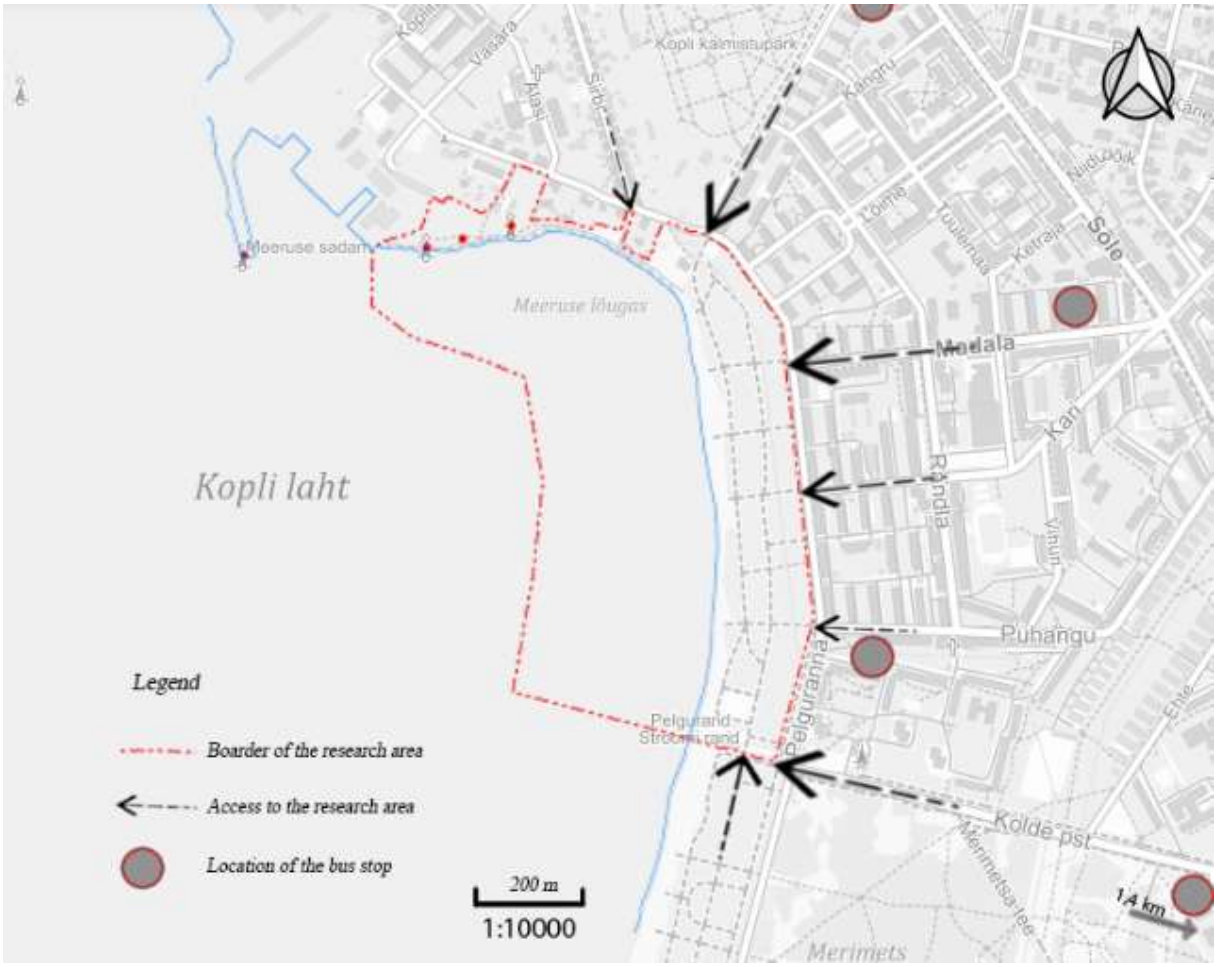

Figure 3. Author´s scheme of park users accessibilities to the research area. (Topographic data: Maaamet)

## Behavioral mapping

*Used data and/or software; theory from the description:*

Behavioural mapping is non-participatory direct observation tool. (BlueHealth, BBAT 2021)

Observers were using tablet computers with free QGIS program. Tablet computers with touch pen were meant for working outside. In the program aerial photographs of the area were used as digital map bases. The site map also contained some vector layers of the features on it - such as paths, water boarders, boundaries including the boundary of the given area, main vegetation, buildings and so on to help to orient better on the map. For extreme weather conditions copies of A4 format black and white paper maps (Figure 4) were printed out.

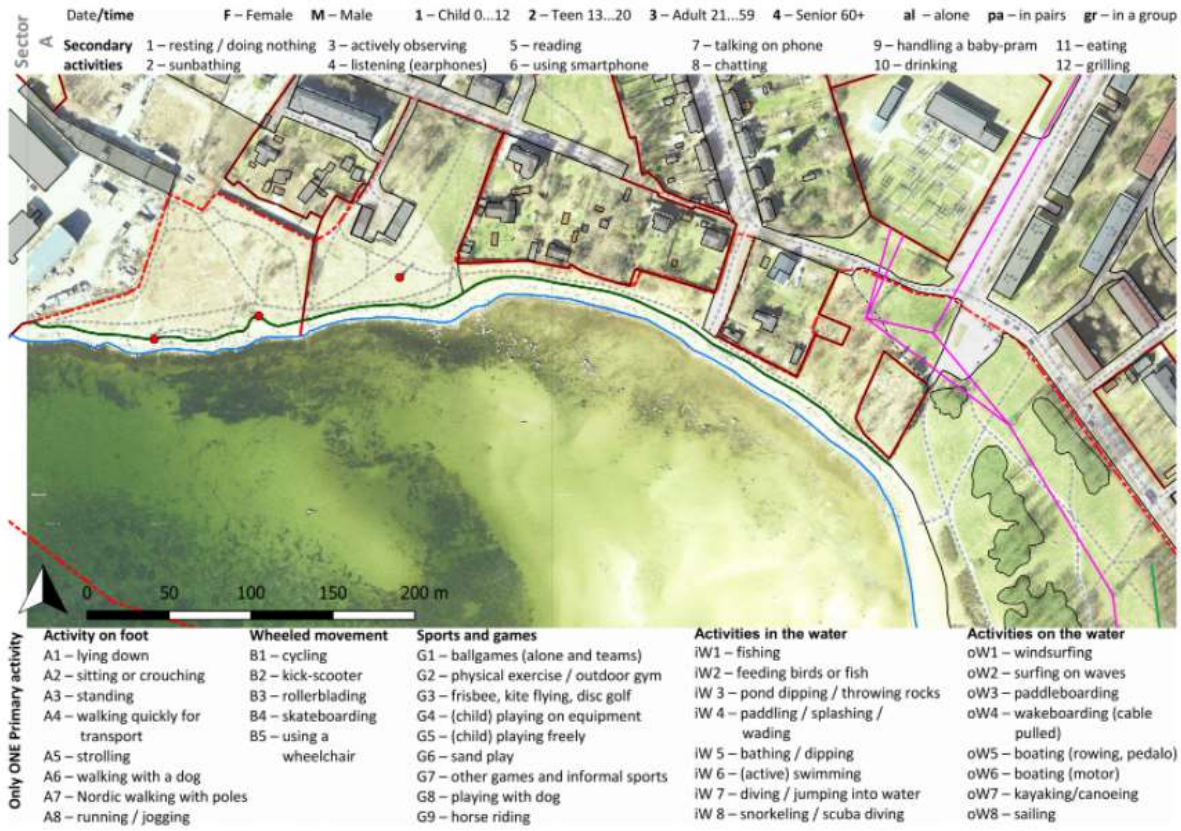


Figure 4. .BBAT tool data collection paper from developed as a back-up (implementation based on Bell, Vassiljev 2017)

*The procedure theory of data collection:*

First of all at the site the observer had to mark down the date, time of day, weather conditions (sunny/cloudy, dry/rainy/snowy, calm/breezy/windy, temperature etc.) and the water conditions (calm or with waves, high or low tide, open or frozen, etc.) (Figure 5). Subsequently every visitor in the marked area with its location and activities is marked on the map. Each point on the map marks an user providing the collected information about the gender and approximate age of the person (registered by the observer), whether they are alone or in a group, social interactions and which type of activities they are involved

primarily and whether a secondary activity can be registered. The QGIS program allows quickly fill for each point and also easily to analyse the information later. (Vassiljev, Bell 2017)

According to site´s size the tool allows to use different monitoring methods. On larger sites observers walk systematically over the area by using several monitoring points. At a chosen observation point the observer stops and scans the visual filed from left to right in a circle. With too many people the circle must be divided into sectors. For a smaller areas the observer can have a single point, where the entire site can be scanned with clear visibility. (Vassiljev, Bell 2017) The area must be observed only once during the observation day.

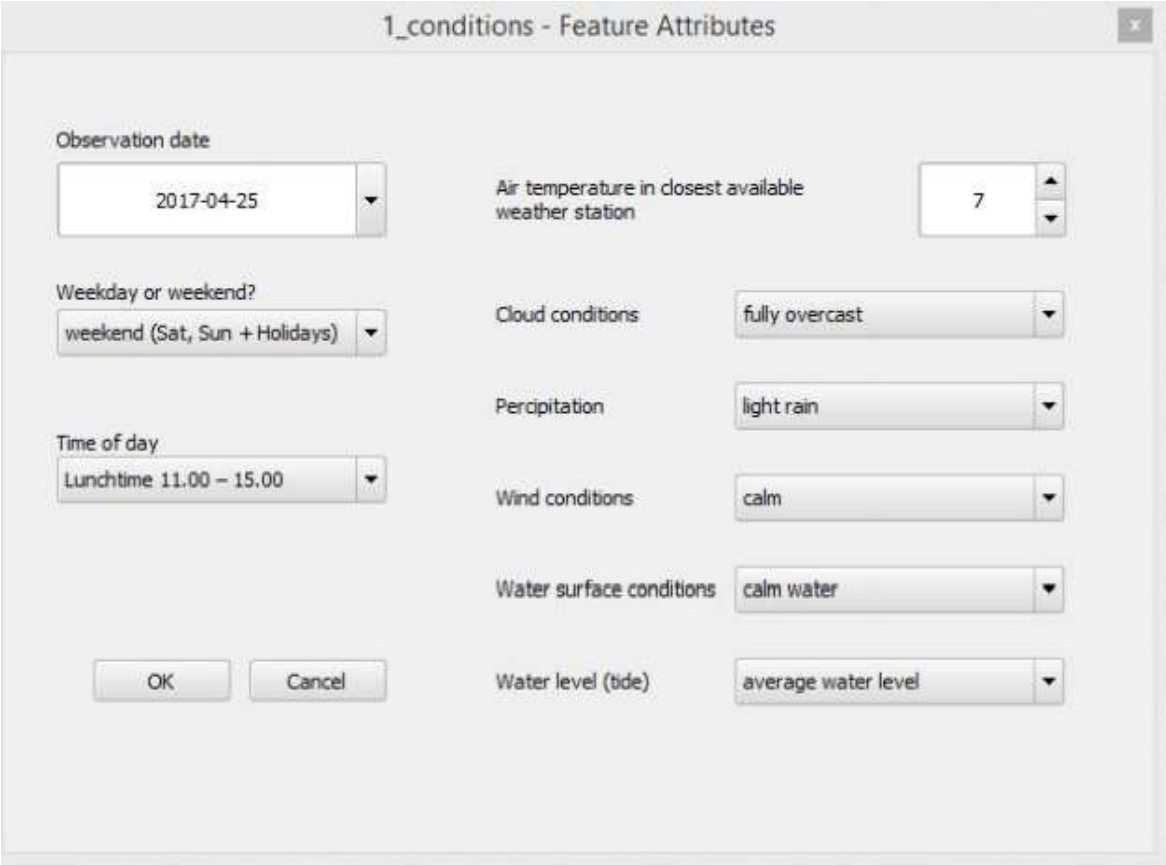

Figure 5. BBAT tool´s weather data window. (Implementation based on Bell, Vassiljev 2017)

The observation period were set to happen from May to September/October with every weather to cover wide range of conditions. The observations followed the same pattern every year to provide good possibilities for comparison. The data were collected every other week. Predetermined scheduling scheme stipulated observations four-time periods within a day (morning 7.00 – 11.00; lunchtime 11.00 – 15.00; afternoon 15.00 – 19.00, evening 19.00 –

23) and tree times within a week – two workdays and one weekend day (Figure 6) (Vassiljev, Bell 2017).

| Observation week | weekday/weekend | date | time in the day |
|---|---|---|---|
| Observation week 1 | weekday | Thursday, May 4 | morning |
| | weekday | Friday, May 5 | lunchtime |
| | weekend | Sunday, May 7 | afternoon |
| week in between | | | |
| Observation week 2 | weekday | Wednesday, May 17 | evening |
| | weekday | Friday, May 19 | morning |
| | weekend | Saturday, May 20 | lunchtime |
| week in between | | | |
| Observation week 3 | weekday | Monday, May 29 | afternoon |
| | weekday | Thursday, June 1 | evening |
| | weekend | Sunday, June 4 | morning |

Figure 6. Ideal sample of the observation schedule (Vassiljev, Bell 2017)

The instructions to on-site data collection meant that forbidden was to take photos, record videos of people or any other act of spoiling people´s privacy. Recordings of the data must be anonymised so it would not be possible to identify those individuals based on the information. Observer´s self-security stipulations are not to put yourself in an unnecessary danger, always inform someone else of your location and when you are expected to be back, avoid unhealthy attention and leave the site when feeling in danger. (Vassiljev, Bell 2017)

*Personal interpretation/description of the observations:*

The main tool used in observation were tablet computer with QGIS. Paper maps were used only with extremely wet weather and few times on days with extra intensive sunlight, when the light was too bright to follow anything on the tablet´s screen. Observation results from the printed out paper maps were later added to the QGIS file in the tablet. More often were all the results added straight to the tab during the observation. Each observation session were saved as a separate folder with date, time of the day and location (Vassiljev, Bell 2017). Weather conditions did not affect the occurrence of the observations. Data was collected in any time and with any weather to achieve best possible overview of visitors and their

behaving in those areas. There were days with an extreme amount of people and adding them all separately to the program were difficult and took more time than given four hours. Some rainy days or early hour´s observations passed by with only few individuals on the entire area.

## Process of the work

The data was collected over three years by different observers, while the author participated largely in the data collection.

In results the data is selected into two parts. The layers with coloured dots of habitants allow to visualize the patterns of how people are using the area. First selection of users are the ones who cross the area with bike, walking fast or also people who go for a run or jogging for example. This group will be named as a User group I: crossing the site as a traffic corridor. This user group consist mostly with adults and they are using the park as a corridor where to move through the area. Second bigger user group are users who come to the place with visiting purposes. All other users divide into a second group named User group II: visitors using the site as a destination point. They choose to stay or to do something in the park. There is some reason why they came exactly to this place.

*Data analysis*

In the results part of this research a current condition and usage of the investigated area will be evaluated through collected data. Results will examine the effectiveness of the area. Practically, based on visitors locations to find out unused and overused parts of the area. In order to fully understand, how the design and planning of blue space affects behavioural activity of the visitors, their decisions how to use the space and its offering and the effects on their health and well-being, the collected data will be analysed.

# Results

## An overview of a data

During three years of observations, the total number of mapped users with activity information was 15443 (Figure 7) - 4626 in 2017; 4362 in 2018 and 6455 in 2019. Total number of observation episodes was 28 in 2017; 31 in 2018 and 30 in 2019. The author of this work participated in 48 of the observation episodes. Heat maps and overview tables were created based on results. There are 17 heat maps presented with explanations and descriptive comments. Thereupon in the conclusion, the information from the heat maps will be compared with the focus on important and interesting findings.

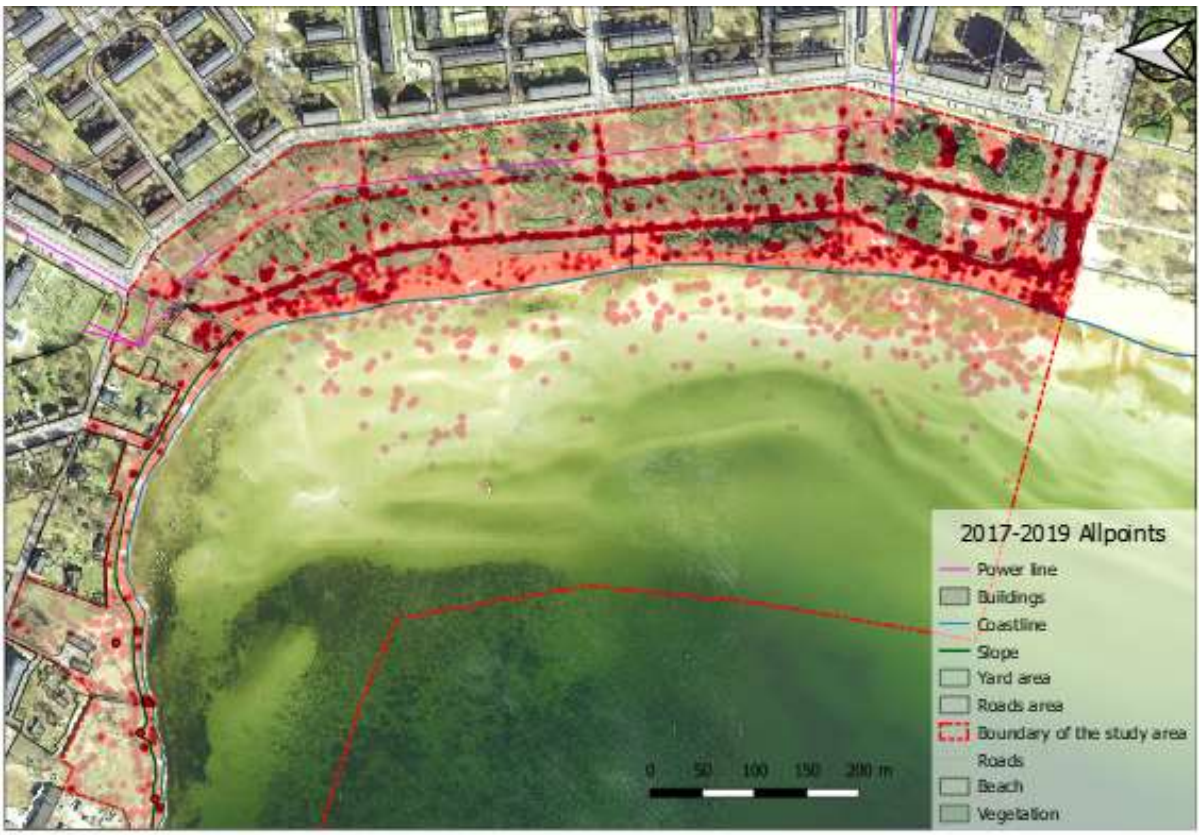


Figure 7. Heat map of all the observed activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

In results part of this work the users of the area are split into two groups based on the character of their primary activity. Two groups are created to make presenting the data clearer and for later conclusions where the outcome will be compared with each other and with literature. First group includes users, who most likely are crossing the research site as a traffic corridor, experiencing the landscape of the area for a short time. The second group has all users with activities, which imply using the park as a destination point, enabling longer stay.

Main grouping aspect was stationary activity or moving activity. Fast movements and activities who´s main purpose is moving forward, through the area and going somewhere else are in the first group, because they are more likely passing the area. Those activities are: cycling, walking quickly for transport, Nordic walking with poles and running/jogging. All other observed activities were classified into the second group. The second group consists mainly of activities, which are bringing the user in to the area, making them stop, inviting them to spend their time in the area. These are not just stationary activities – strolling and walking with a dog, which are actually expressing movement, are also assigned into the second group as a destination point users. Those users are spending time outside by walking just like for sports and games activities, when people come to exact location for it. Strollers come to have a nice walk in a nice place. Additionally, other wheeled movements (kick-scooter, rollerblading and skateboarding) were mostly done by children and teenagers allowing to assume that they were coming to the area together with friends or grownups and not using the site as a passing corridor but as a destination point.

In addition to primary activities, some secondary activities stand out on their own (sunbathing, handling a baby-pram; eating, drinking and grilling) and are explored with the help of heat maps. Other secondary activities are not having any outstanding feature to influence the activity and appearance on the heat maps by their own, either due to low occurrence rate or parallelism in some cases.

For example, the primary activity of lying down was almost always marked together with secondary activity of sunbathing. There were 1172 persons recorded as lying down at the observing moment and only 89 of them were without secondary activity of sunbathing. Those users were probably just covering up to shield from sun burn or instances of antisocial behaviour like being too drunk to stand up or similar.

Using a wheelchair is an example of secondary activity with low occurrence rate with only 19 instances in the whole data covering three years of observations. The distribution pattern is very similar to other movement expressing activities. The asphalt road closer to coast and stopping points with a view to the sea were the locations were wheelchairs were spotted, while none were detected on the sandy area.

Few activities, which are in the option list were not recorded at all. For example no users doing horse riding, snorkelling or scuba diving nor boating type activities on the water were observed during the observations in Tallinn.

## User group I: crossing the site as a traffic corridor

There were 1841 persons recorded while cycling, running, walking quickly or walking with Nordic poles. Figure 8 shows how many users were crossing the site accordingly to activities.

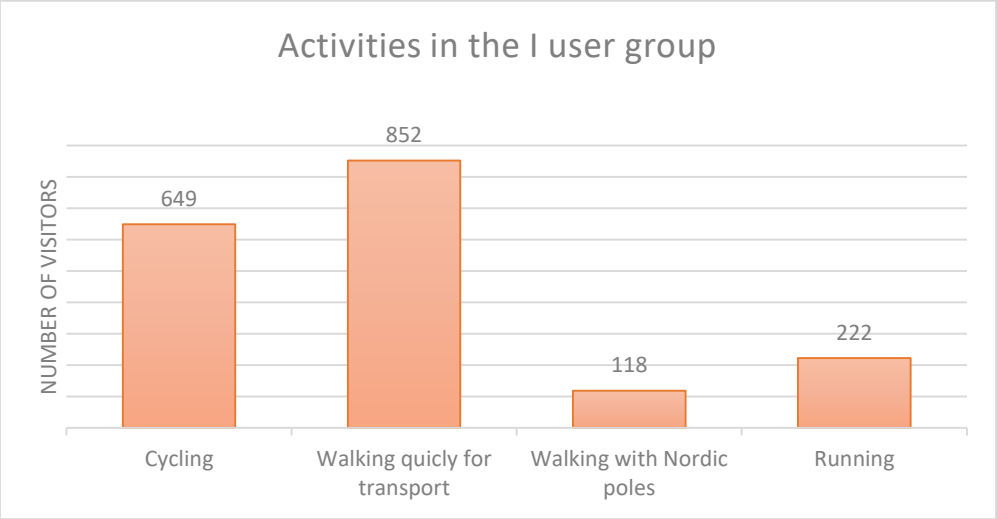


Figure 8. Diagrams to show the amount of users in the research area 2017-2019 (based on observations)

Multi-coloured heatmap (Figure 9) shows how park visitors who are most likely using the research area as a traffic corridor in the city landscape spear on the research area. Users are on the roads and also on the sand, but grass fields are empty from movements. Kopli beach part of the area is very unused by all activities from first group. Therefore the beach house surrounding is definitely an entrance or leave for most of the passers of the area. Overall information what draws out says that people prefer to use the road which is closer to the coast.

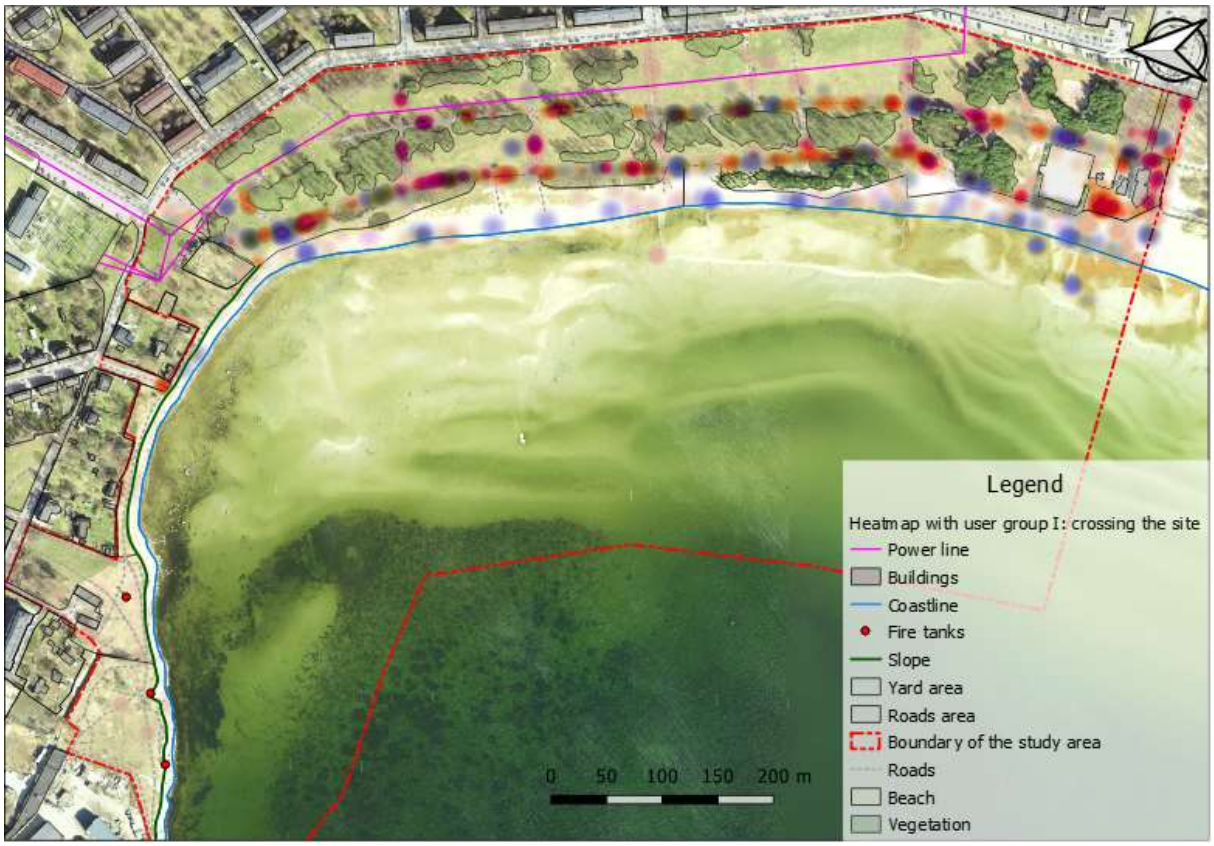

Figure 9. Heat map of all the user activity who are crossing the site as a traffic corridor in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

## Cycling activity


Figure 10. Heat map of cycling activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Cycling activity (Figure 10) covers the area surprisingly equally, except for Kopli beach area, where only one red spot is recorded at the end of the Sirbi street (Circle A on the heat map). Narrow rocky path there is difficult to handle with a bike. Cycling is recorded without exceptions on the roads only. Interesting finding is that there are no cycling activity recorded on crossing roads leading up to the sea, only on two main roads parallel to coastline running through the whole area. Higher activity can be seen on the road closer to the coast (Circle B on the heat map). Presumably, entering and leaving the research area with a bike is near the beach house side of the park and at the end of the maintained park area. There is bigger activity on a little square in front of the beach house (Circle and scheme C), where bikers may take a stop or slow down to observe the sea.

## Walking quickly for transport activity


Figure 11. Heat map of walking quickly for transport activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Quickly walking activity (Figure 11) is highest between the beach house and the nearest bus stop (Circle A on the map). Around the beach house there is the spot where users are arriving to the research site or leaving it from the two main directions. Results are showing bigger activity also in the second biggest connection point (Circle B on the map), where there is another bus stop and smaller shopping centre nearby. People are turning there from the seaside to the outgoing road. Very little quick walking activity appears on the beach, and those mapped users were probably moving actively for exercising purpose.

## Nordic walking with poles activity


Figure 12. Heat map of Nordic walking with poles activity in research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Nordic walking (Figure 12) is not the most popular moving method in the area. The activity in general is infrequent, especially compared with other activities. Almost all of mapped Nordic walkers are captured on the road closer to the coast. This pattern appears on other activities heatmaps also. Heat map shows a more popular point near the beach house (Circle A on Figure 4), where is a nice place to stop and enjoy the view. Based on the map can be said that users probably avoid the less active area in Kopli beach. There is none captured activity there. Sandy area turns out to be nice place for Nordic walk as singular purple colours are showing (Circle A on the heatmap).

## Running activity


Figure 13. Heat map of running or jogging activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Running activity (Figure 13) is equally spread on the maintained area and none is mapped in Kopli beach side. It is interesting finding, because there is rocky path at the beginning and then trampled path in grass, which are perfect for jogging, but it is dead-end direction. Runners are using the area probably in both directions along the shoreline. They can pass it as a green corridor and they can also use the park and coast for running in a large circle. In contrast to previous distribution maps, the running activity on the sand is equal with activity on roads. Other movement activities are showing how users avoid sand. On this map activity in the water can be noticed around the beach house. Probably some swimmers or bathers are running in the water.

## User group II: visitors using the site as a destination point

In Figure 14 appears the most popular activity. There were 4236 strollers observed during three years. The second popular activity was sitting. Other activities were observed not so often according to the diagram below.

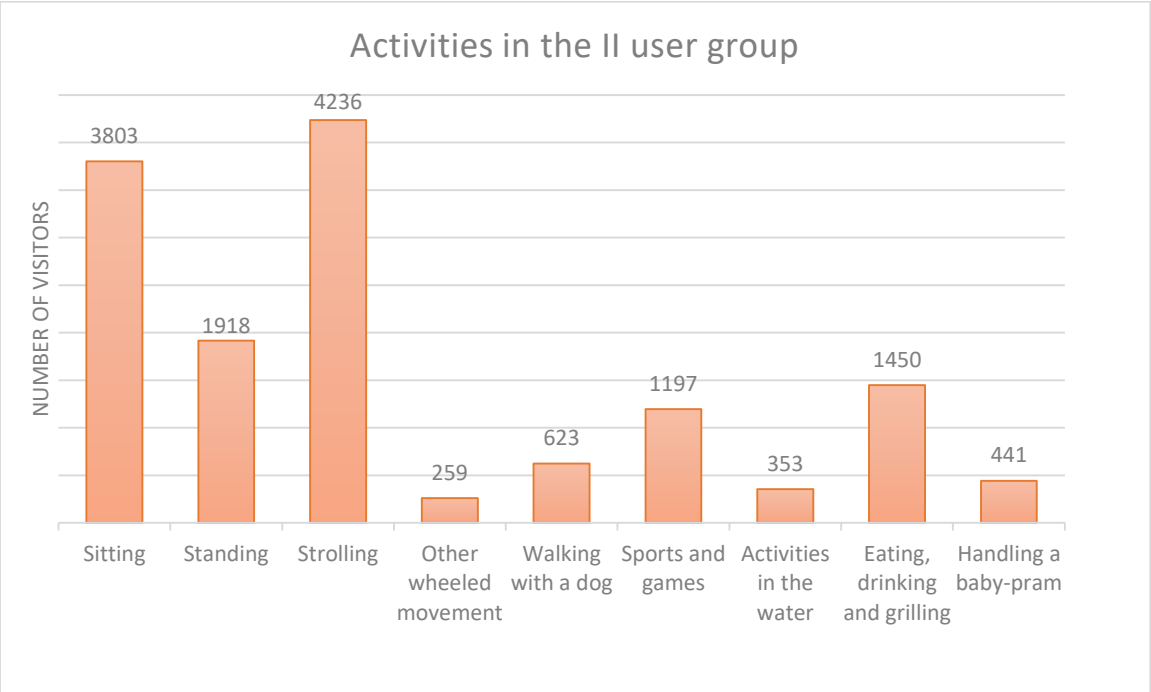


Figure 14. Diagrams to show the amount of users in the research area 2017-2019 (based on observations)

On the heatmap (Figure 15) below the dots are showing users, colours are not completing with each other. Calmer area can be seen in Kopli beach and on the grassfiled in the Stroomi park. Maintained area invites people, but the actually popular line is the coast and roads. Around the beach house there were always people observed.

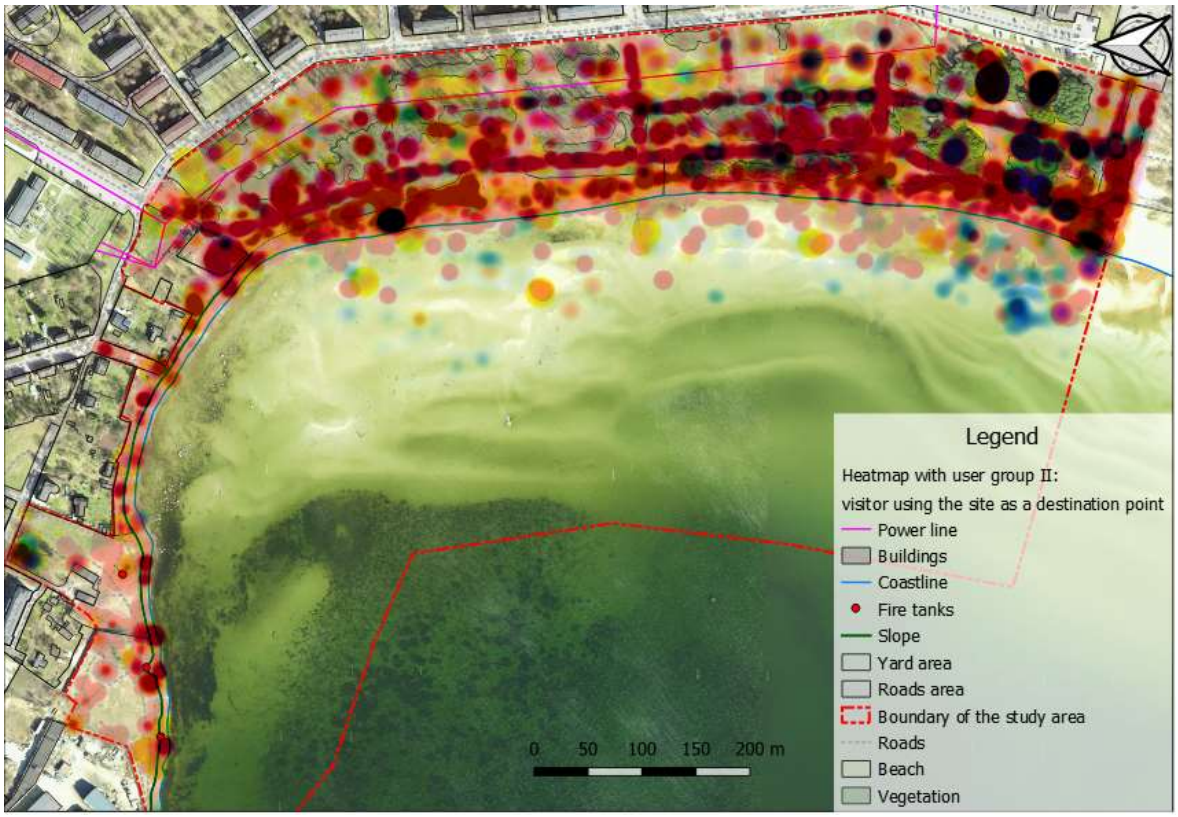

Figure 15. Heat map of all the user activity who are using the research area as a destination point 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Sitting or crouching activity

Figure 16. Heat map of sitting or crouching activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Sitting activity map (Figure 16) represents behavioural activity information from 3803 visitors, who were sitting at the current observing moment. There were 1262 users in 2017, 862 users in 2018 and 1579 users in 2019 sitting during the observations on summer period from May to September. In summary 3803 users of the part were sitting at the observation moment (Figure 14).

Most of the people are gathering for sitting on the beach, probably to enjoy the view, light breeze and direct sunlight. Part of them are probably also sunbathing or eating as a secondary behavioural activities. As evident from the heat map, in the middle of the grass filed there are tables and grilling opportunities where the red heatmap colour appears stronger. Trees are offering shade for the users who wish to avoid direct sunlight. Near the roads, people are sitting on benches (stronger red dots in the circle B). Notably, most of the sitting is users are gathered near the coastline, while grass areas behind both roads have very little sitting activity. The strongest colour can be seen around the beach house and along the coast. There

is a concrete wall, where people can sit without stepping on the sand (Circle A.). It turns out to be very popular spot to stop. In addition, next to the beach house there are popular chairs and tables which belong to the cafe and are removed turning the winter period. In the opposite corner of the area, where in 2019 another restaurant building was completed, a new popular sitting place has appeared as the stronger red dot indictes. In front of the restaurant there are two bigger rocks, two red dots symbolizing them, which also turned out to be quite popular natural place for sitting. Kopli rocky beach part is obviously more secluded and before the small interventions in spring 2019 there was very little sitting activity. Those separated red spots are exactly new sitting places and appear from 2019 observation results. As the very light red colour on the remaining area of the heat map shows, the sitting activity was very scattered on rocks and bigger concrete pieces.

## Standing activity

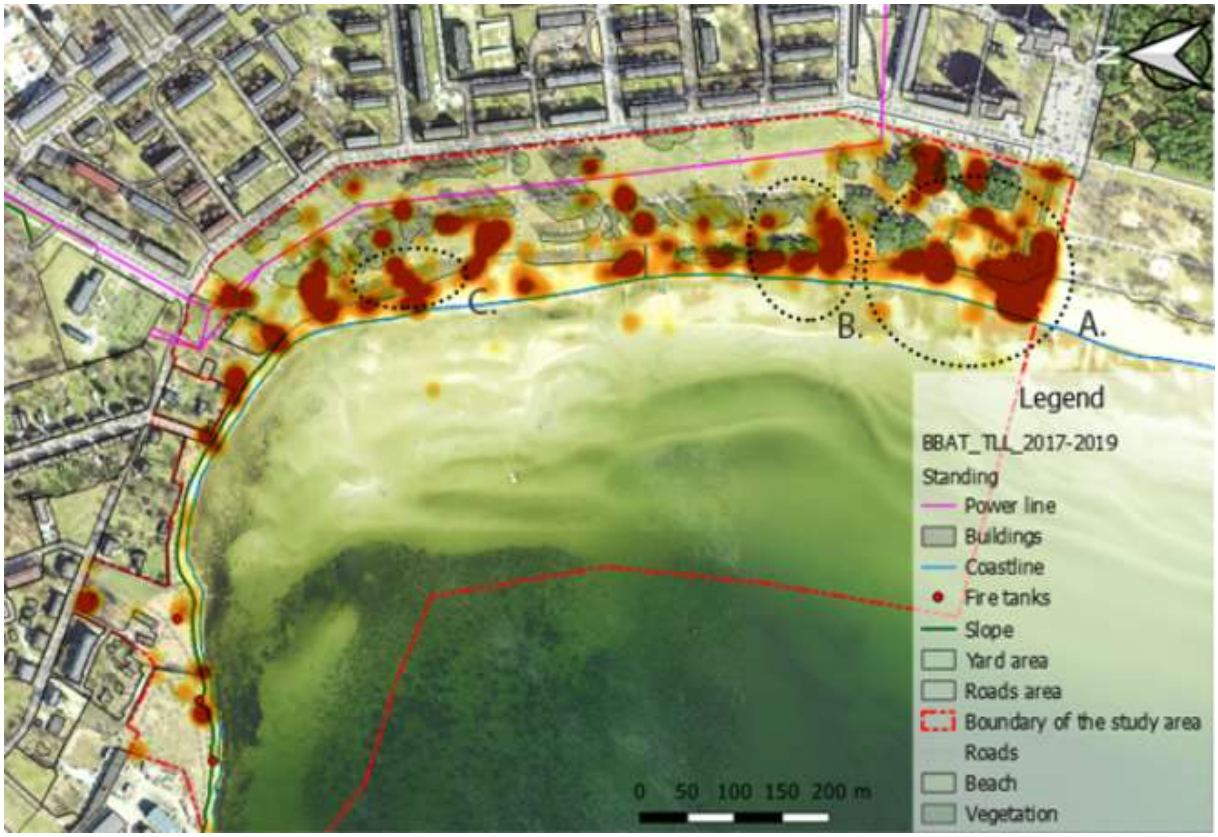

Figure 17. Heat map of standing activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Clearly the most popular standing spots (Figure 17) are with a view to the sea. The surroundings of the beach house appear very attractive place for it (Circle A.). There is asphalt and wooden path on the sand to get closer to the water. The area surrounded with circle A. offers a space where people have room to stop without being on others way. Also, popular points for standing are the spots where crossing paths are ending and the sandy area starts (Circle B. and C.). In short, places where people can stand without getting their shoes sandy are popular. Most popular place of them is the end of the crossing road from the bus stop, where people seem to come directly to see the sea, and under the pine trees next to it. Pine trees are standing a little bit higher and they offer shade with comfortable ground to stand on. Very few visitors have been mapped standing in the water. Remarkable place with standing activity appears around the playground. Probably mostly grownups are staying close to observe their children playing. Other spots appear randomly on the roads where users need to stop for a second or meet someone for a little chat. In the middle of grass fields there are people also standing around picnic tables and grilling or even taking part of a birthday celebrations in bigger groups. Compared with other activities in Kopli beach, standing activity can be seen with stronger colours. The place is quiet, offers privacy and an experience of wilder nature. Sometimes swans are showing themselves and rocks offer an opportunity to get closer to the water without stepping in to the sand.

## Strolling activity

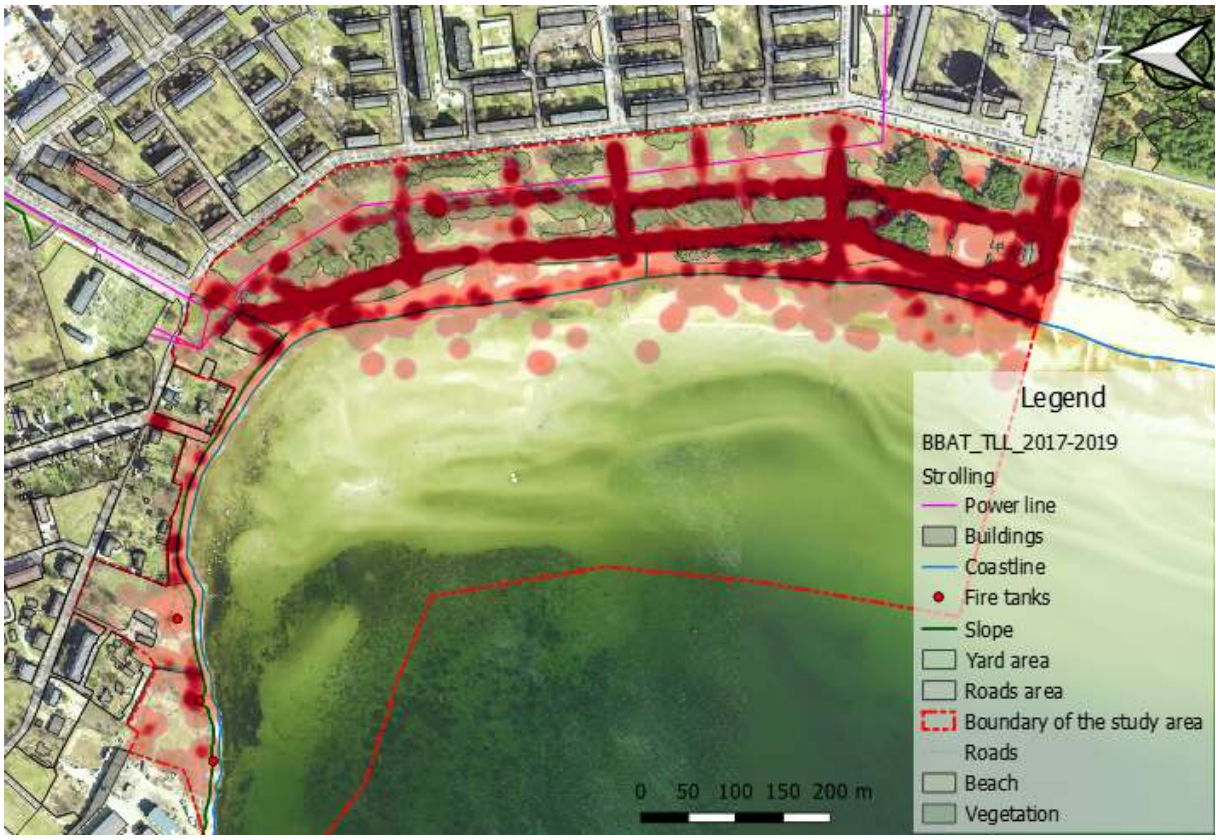


Figure 18. Heatmap of strolling activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Strolling (Figue 18) is one of the most popular activity and movement style in Stroomi research area (Tabel 1). The heat map with strolling activity draws very firmly out the whole roads' structure in the Stroomi beach park. Strong red colour is creating almost a constant line of user activity. Two main roads running parallel to the shoreline through the whole area are not equally used though. The road further away from the shore finds less users and second part of it has no continuous red line, which means that less visitors are choosing to take this path. Perhaps the reason is that it is taking a little arc before leading out from the area and people prefer to walk more straight to the exit. In addition to delineating the path network of the area, the heat map also shows how people are using the strip of sand right by the water for strolling. Light red dots can be seen even in the water. Assumingly they were observed when the water level was low and wider sand area offered an opportunity to take a walk on compacted sand. Strollers seems to find their way to the Kopli beach more easily as the light red marking shows considerable coverage on the rocky part of the area.

## Other wheeled movements – kick-scooter, rollerblading and skateboarding activity


Figure 19. Kick-scooter, rollerblading or skateboarding activity in research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Small darker spot draws out where wheeled movements (Figue 19) probably enter the area or often gather around benches there. The heatmap clearly shows the popular trajectory of wheeled movements, while the rest of the road structure is lightly covered with wheeled movement user activity. More popular accesses point to the area can be read out as well (Circle A.). This is also dependent on strolling activity, because kick-scooter, rollerblading or skateboarding activity is presented from children or younger teenager age groups who do not visit the site alone and are not independent users. The most popular spot is on the basketball square covered in asphalt beside the beach house. It shows where most of the wheeled movement by young people are gathering. There are more teenagers who come by their own or with friends. Equally around the park are moving around those users who probably come along with parents. Kopli part of the research area is clear from wheeled movement due to the lack of asphalt roads.

## Walking with a dog activity

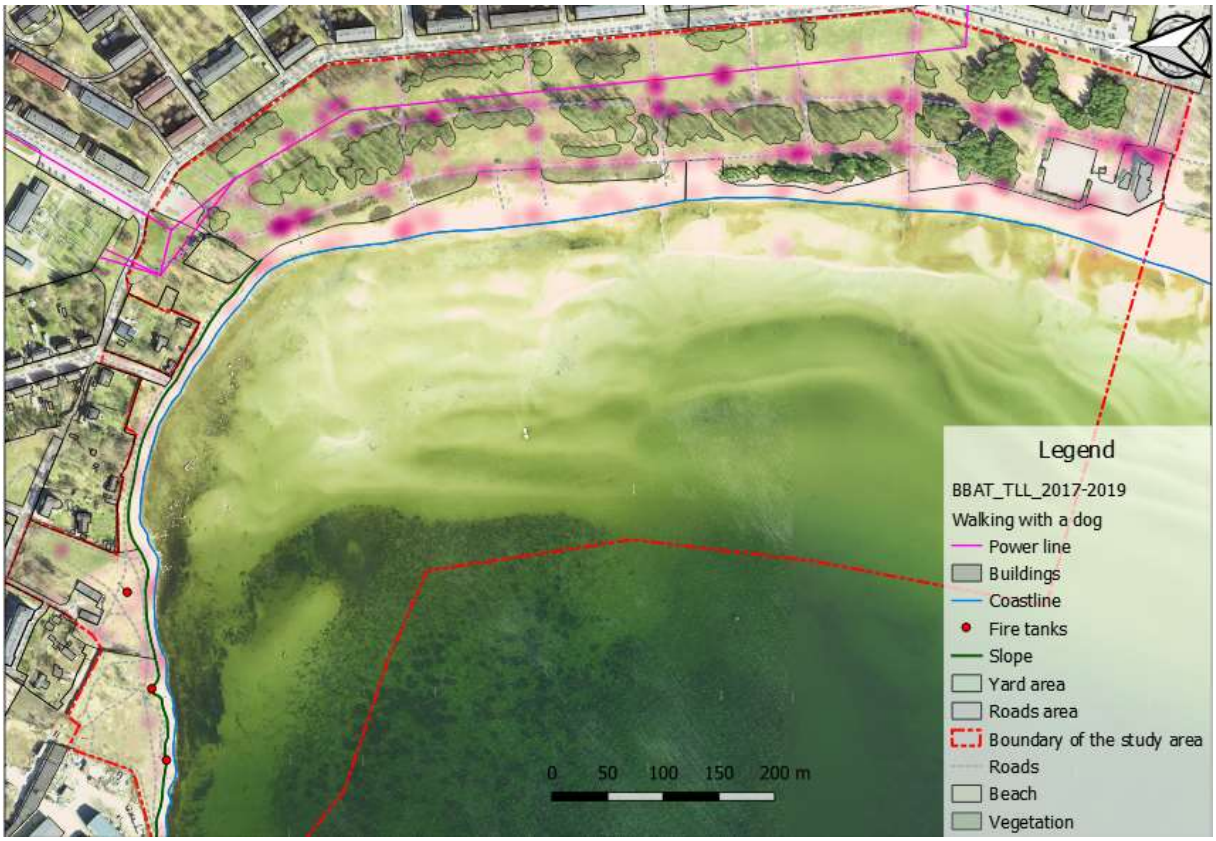


Figure 20. Heat map of walking with a dog activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Visitors who come with a dog (Figure 20) are quite equally using the whole area. Perhaps they are using the two roads as a possibility to make a circle. However, few more active spots than rest of the area can be noticed. Again the beach house surrounding is popular, they are often walking by or entering to the area from there and secondly, the corner where Kopli beach starts. People can let their dog swim in Kolpi beach or the appeared stronger spot can also be a coincidence when few dogs took a moment to sniff each other. There is one bench appearing strongly, perhaps where owner or owners with more than one dog taking a moment to rest. Interesting findings show that dogs are being taken for a walk on Stroomi beach´s coast guarded area, where dogs are not allowed.

## Sports and games activity of children

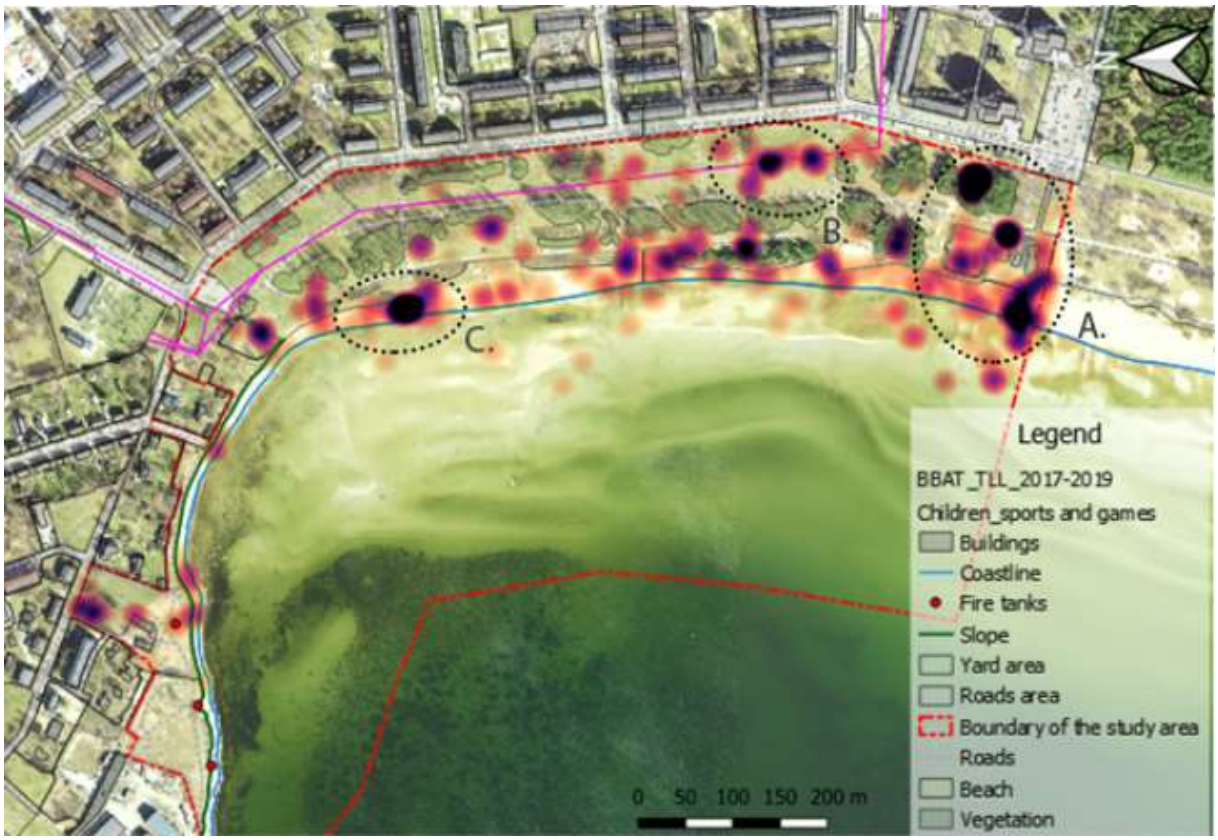


Figure 21. Heat map of children's sport and games activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

It is clearly visible from the heat map (Figure 21), where the only playground in this area is. The darkest spot is definitely the most attractive place for children. Another lighter sport activity appears in the middle of the area. There are two swings, which invite passing children from the road to make a stop. Circle B shows the location of a football square, it is just a field of grass where anyone can play games of any description. Some activity can be seen on the roads as well. On the sandy areas are also activity hot spots. Sand and water invites to discover the beach and parents are taking children straight to there along mainly used entrances (Circle A. and C.). In addition to stronger hot spots, the sports and games activity is evident in multiple sporadic spots dotted around the whole area, except Western tip of the Kopli beach.

## Sports and games activity of teenagers


Figure 22. Heat map of teenagers' sport and games activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Teenagers are gathering most likely at the same hot spots where children (Figure 22). Their spread seems more confined to the hot spots. They stop to swing and they visit the playground (in the Circle A.). Still the most attractive place for them seems to be the basketball square. From the heat map, it can be seen how they gather on one side or to the other side of the asphalt square, but not in the middle (Circle A.). There are four basketball baskets, one in each corner and it allows different groups to gather at the same time. A little teenager's activity is on the football square as well. It is covered with grass and there are no benches, so this is not so much used for just hanging around.

## Sports and games activity of grown ups

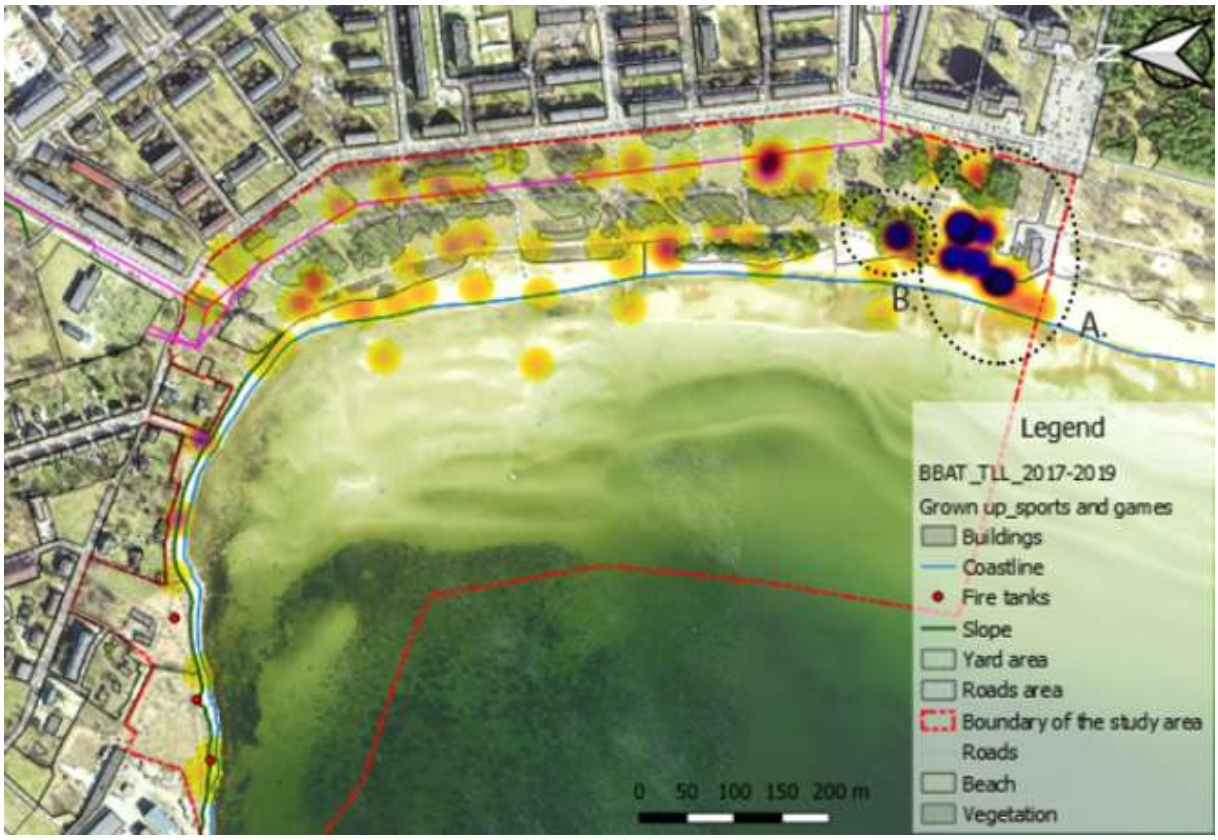


Figure 23. Heat map of grownups' sport and games activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

As grown-ups (Figure 23) age-group is between teenagers and seniors' groups the heat map shows similarities of sport activities with both user groups. Adults are also actively using the basketball playing option (Circle A.). There is user activity visible in each corner of the square. Similarly strong activity spot appears in front of the beach house, where volleyball squares are on the sand during the summertime. Like seniors, often they find their way to an outdoor gym (Circle B.), which is under the pine trees. Light activity can be noticed on football square. Adults age group is the only who uses actively all sporting and playing possibilities that this park is offering. In addition, adults' activity appears equally on the roads around the park. Even Kopli beach is inviting for this user group.

## Sports and games activity of seniors


Figure 24. Heat map of seniors' sport and games activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

The heat map with senior's activity (Figure 24) has one very strongly pronounced spot (Circle A.). This is the place with one surprising finding. There are a couple of tables and elderly men are gathering with a nice weather to play table games. It is not known for sure from this research data what exactly they are playing, but as the heatmap proves, it is very popular. This interesting phenomenon includes only male users of the park. There have never an observation of a woman's playing with them during the 3 years of observations. The hotspot of table games is a very positive finding how people are using outdoor space, but the downside of this large concentration of users, captured in the data as well, is the occasional use of nearby trees as a public toilet. Besides previously described finding the physical activity of seniors is the strongest in outdoor gym (Circle B.). Some light colour is visible on basketball square. Noteworthy is the fact that elderly people are using the sandy part for physical exercising more than other users. Not much activity has been recorded in Kopli beach.

## Activities in the water


Figure 25. Heat map of activities in the water in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Predominantly, the most active spot of activities in the water (Figure 25) is in front of the beach house (Circle A.). In general, it can be said, that activities in the water are not too popular. The overall activity is quite low. Compared, for example, with sunbathing activity, which is abundant in the research area, people are not using the water so actively. Even less water related activity is mapped in Kopli beach. The explanation might be in poor Estonian weather and in negative fame and suspicions about unclean water conditions.

## Eating, drinking and grilling (secondary) activity

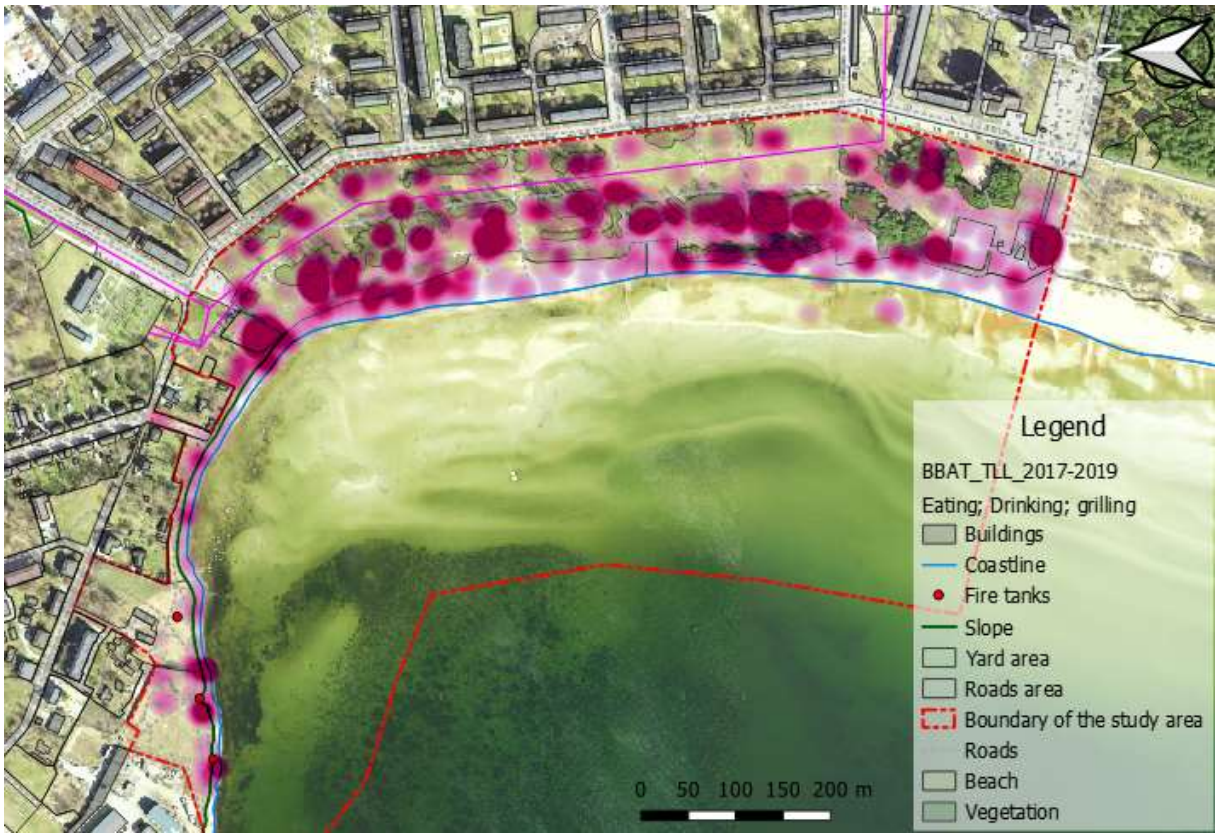


Figure 26. Heat map of eating, drinking and grilling activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Eating, drinking, and grilling activities (Figure 26) have been represented on one heat map together due to to the similarity of the activities. All three are secondary activities and expressions of food and diet. This heat map can be compared closely with the sitting activity heat map. The stronger colour appears like bubbles around tables and benches similar to the sitting activity heat map. In the middle of grass fields there are options to have a picnic and do some grilling around transportable tables. Everywhere else on the grass, people are using the place for picnics while sitting on the blankets and enjoying the park. One colour bubble marks the place of a beach house café and one the place of a newer restaurant. In Kopli beach, the purple spots representing eating, grilling and drinking appear where sitting places for the BlueHealth project were built. After small interventions in Kopli beach there is eating activity mapped, but earlier, the activity level is very low. In conclusion people are looking for a place to stop and to sit for eating and drinking. They are not doing it so much during movements.

## Handling a baby-pram (secondary) activity


Figure 27. Heat map of handling a baby-pram as a secondary activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Persons handling a baby-pram are walking everywhere around the park (Figure 27). This is the most equally spread activity in this research. The only stronger spot is the place with an asphalt and a view to the sea near to the beach house. The colour of activity is covering every road in the maintained park and few places in Kopli beach. Understandably, the rocky part might be uncomfortable for a baby pram and makes people to avoid this path. Interesting is to see, how visitors with baby-prams are using every single entrance to the area. All crossing roads are having light purple activity marks. Grass covered areas and the playground are not having any activity from baby-prams, but somehow basketball square, which is covered with asphalt, is showing baby-pram activity on it.

## Sunbathing (secondary) activity

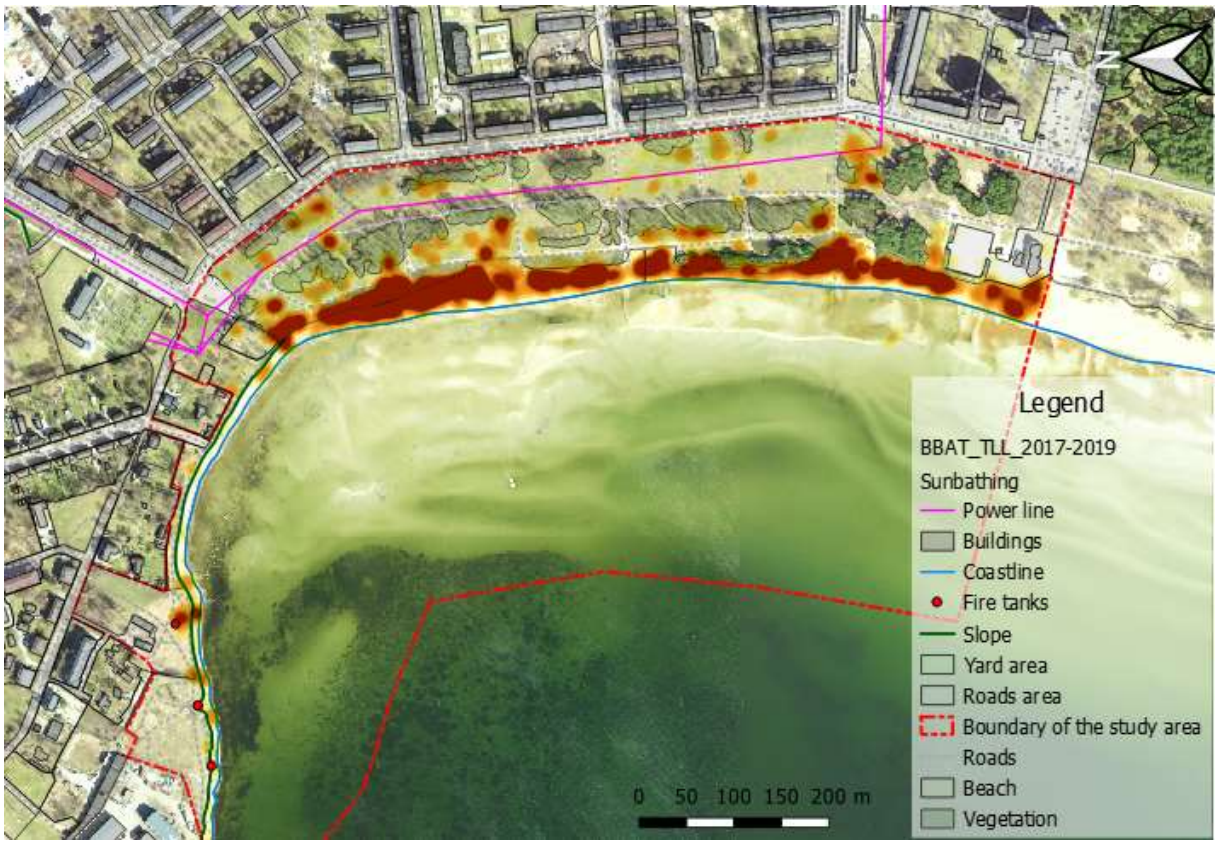


Figure 28. Heat map of sunbathing activity in the research area 2017-2019 (Topographic data and orthophoto: Estonian Land Board 2018).

Sunbathing activity (Figure 28) is most abundant at the beach and on the sand. Less active is the activity between the beach house and waterline. Probably because there is very large concentration of other activities and this leaves less room for sunbathing. The same pattern is visible at the ends of the asphalt roads crossing the park and terminating at the beach. Based on the heat map, people prefer to lay down in a place where other visitors are not moving around so much. Interesting is that one grass area has more activity than others. For some reason users are gathering to the grass which is closest to the bus stop near the Northern end of the area. There is huge power line and the landscape offers little relief difference with small concavity. Therefore it might offer some apparent privacy.

## General information

Result were affected by small interactions on the landscape. In the spring 2019 building the objects like benches and platforms planned by BlueHealth program were finished and the new café or restaurant building got ready and they also opened at the end of 2019 summer. The restaurant is located at the end of the maintained park before the stony beach starts. It has a little playground next to the terrace, it appears on the heatmap, but data is only from last summer observations.

## Notes on the applicability of BBAT method

*Strengths and weaknesses, positive and negative aspects of activity information collecting*

With so many options to choose while adding the information to the program creates a huge collection of information. This method of mapping every person separately with wide selection of primary and secondary activities gives an endless opportunities to analyse the usage of the area. Analysing the sites is one of the most important steps in landscape architectures everyday work. The BBAT method contributes a well-developed tool to get an overview of any kind of behavioural activity in any sites.

It has been complicated to make a decision which data should be used for this work as the main goal is to find out the potentials of the given area in Tallinn. The volume of the data collected over three years offers a lot of possibilities to rise endlessly questions and to work with a lot of different details in this work. There is so much information and options that focusing on specific topic is necessary.

The only negative aspect of collecting the activity data of behaving was that there were no negative activities in the selection of the data entry forms. It was not possible to conveniently add activities like smoking, throwing litter to the ground or urinating in public which was sometimes observed even in well notable places like grass fields or against trees near roads where other citizens were walking. Another example is drinking alcohol in public place. As it is forbidden in Estonia it can be categorized as bad example of behaving and is also negative kind of activity for an open park. There were not possible to mark that kind of unpleasant behaviour of citizens to the program as an optional selection. The only possibility

to mark down negative activities was to write extra comment/note to the point which marked the particular person on the area. Adding extra comments took a lot of valuable time especially during very busy and intensive observation days when there was no time to waste. Writing extra comments additionally to points were used only for very important or interesting occasion. Smoking therefore was very often noted secondary activity for adults. In brief data collected with BBAT method in this work has only positive activities recorded and analysed in its results.

There was one positive activity meet during the observations which were difficult to decide where to categorize it. In some cases it was difficult to decide whether the person is walking quickly to the transport or strolling. Sometimes there were a person who was walking quickly, but obviously not going to the direction of a bus stop or on the contrary strolling directly to the bus stop. Then had to make a decision to which activity it is more likely.

There were one missing activity which were seen in many times. Instructions say that persons who are clearly in the water had be marked down by doing something in the water. There were in the water activities section. Problem appeared when scrolling or walking in the water option was not “logical”. This is one attractive thing to do in Stroomi beach, when the water is low and people prefer to walk on the sand.

Weather conditions did not affect the occurrence of the observations. Data was collected in any time and with any weather to achieve best possible overview of visitors and their behaving in those areas. There were days with an extreme amount of people and adding them all separately to the program were difficult and took more time than given four hours. Some rainy days or early hour´s observations passed by with only few individuals on the entire area.

## Other circumstances

Mapping itself was complicated while adding a bigger group of people with the same or similar user profiles. People were moving around, it was hard to count them and they were changing their activity quicker than adding every personal separately to the tablet took. It

would have been more comfortable with an option to add a group as one dot with the number of people and their same activities only once as a group activity. This suggestion needs a software development and no changes in the method itself.

Mentioning worth observation and data collecting difficulties were in some cases extreme weather conditions. Strong rain and windy weather made using tablet computer complicated while it had to be protected from the rain. On the other hand very bright and sunny days made using the tablet computer´s screen impossible. Other negative aspects are about the area and locational aspects. Some of the local habitants have inappropriate type of behaviour, suspicious contingent can be noticed. Garbage throwing and public urinating problems can be seen often.

It was positive to record mostly older people spending their time outside, sitting or strolling, Astonishing was to see so many people swimming despite of perhaps not the cleanest water or using the area as transport corridor, also time spent with children and dogs or the location used as meeting site and older café often visited despite of ugly building. Outdoor gym found a lot of use and older man´s meeting point to play cards or checkers on specific benches in one location.

# Discussion

All activities appeared with little differences or similarities. Visitors of the park are using the same area, but are interested in different activities. In this chapter behavioural activity will be compared with each other and attributes used or needed in the park will be brought out.

Weather aspects will not be taken into account as there were observations with every kind of weather and due to this the impact of weather is already appearing in the activity information. Each observed person was added with gender information, in this research, gender is not important aspect and will not show differences in the behavioural activity as general usage of the park.

The differences of each age group are comparable in sports and games activities, where age groups need variable and activity pattern draws out differently. Whether the observed person was alone, in pairs or in groups, only children play a role, because they are not individual users of the outdoor space.

## Comparison between activities

When comparing cycling activity with other movement expression activities on the heatmap, there is clearly visible, how users have created two line-similar cycling activity pattern through the area. No other activity draws out like this and it proves that cyclists are using the area as a traffic corridor. This is very practical method how to use a park as there are blockhouses surrounding the site and people decide to use a road in the park to get somewhere they need to go. On the heatmap appears a need for a place to slow down and roll with a bike. It can be compared with standing heatmap, where appeared spots, which are at the end of crossing roads to the sea, people find a moment to enjoy the view. The cycling activity heatmap proves that **there is a need for a bike lane with a view to the sea and few places for an opportunity to stop** as well.

Running activity is very equally spread all over the maintained area in Stroomi beach park compared to other movement activities. Kopli beach has no running activity at all and it shows very clearly how people are not feeling safe enough to go there. Still, for **runner type of users there is a need for a possibility to run a circle**. Similar need is for wheeled movement activities. Mostly children and teenagers who come with a wheeled equipment are in a second group where users who use the area as destination point are and they also **need an opportunity to make circles** while their parents are walking slower than they move.

As one of the hypothesis was set, the most popular activity observed was strolling. The heatmap proves how people are strolling in Kopli beach. Of course the activity is more intensive around the maintained park area, but the strolling is covering the stony area as well. The area is so unused and serves more visitors attention.

Standing heatmap is comparable with sitting activity, because the similarities are showing the location of benches. Heatmap with standing activity displays another very important aspect. Notably locations and higher spots with a view to the sea are more popular. Another conclusion shows that **the most important factor to make the area attractive is the view to the sea** and this fact makes Kopli and Stroomi Beach Park, the blue space, area more valuable park than green spaces are.

Sitting activity appears on the map everywhere where are benches or tables. Very similar pattern to it is on the eating, drinking and grilling activity map. People sit and eat everywhere where are benches and tables, but on the beach, as well. The number of benches and tables seems to be enough and also argument, if people are using them so actively. Sitting and sunbathing at the same time is quite common activity on a hot summer day, it looks like there is not enough space on the sand where people lay down and sit. Sunbathers gather mostly to the sand, but people who were mapped by sitting activity are spread more equally around the park. Probably sitting activity presenters split into two – the ones who also sunbath and the ones who seek for shelter from the sun. They have found places on the grass fields under the trees.

The heatmap with walking quickly for transport activity shows two areas to be more actively used. The area surrounding the beach house, which is with the highest activity of the full

area, is more used by quickly walkers as well with strollers, Nordic walkers with poles, with baby-carriage walkers and dog-owners. Last three activities prefer to walk on the asphalt road and do not go to Kopli beach by coincidence almost at all. Even when only baby-carriage users of them have a reason to find asphalt road more comfortable. In the water activities location is correlated also with the beach house location, where the accessibility to the water is strongly more used.

The different use of the park between age groups as appeared on the sport and games heatmaps is very interesting founding and certainly need separately investigation in some other thesis. Important for this work is hoe the location of them appeared around the beach house. All four age groups were mapped intensively, because there are the only playground, gym and ballgames opportunities. It might be **needed to create some sporty facilities to the north part of the park** so they will offer a chance to do sport for more people at the same time.

## Comparison between Stroomi and Kopli beach areas and the site as a blue space

The park is very one side oriented and it is perhaps uncomfortable to find an optimal trajectory to visit further part of the beach. The intensive behavioural activity in the surrounding of the beach house in the south of the park can be explained with access to the area (as Figure 3 shows in chapter "*Description of the site"*). The location of the research area in the city is not inviting people to pass through and for people who come from other directions of the city than Kopli peninsula the entrance to the research area is from the direction of the beach house. Still, the Kopli beach part has higher value based on the literature research. There is an opportunity to meet wilderness and more diverse landscape than in the maintained part of the park. Also the view there turns over the Kopli bay back to the city facades.

Lack of movement in every type of activity in Kopli beach can be described with many reasons. On the first hand it is quite separated from the rest of the area and visitors are perhaps feeling uncomfortable or not safe there. The last mentioned reason is based on the

contingent as well. Kopli beach offers so much privacy that even negative examples of behaviour activity might often gather right there. The area is unmaintained and looks very natural with high grass and rocky coast. On the other hand the most important reason why activity is not appearing there strongly is that it is dead-end direction. Visitors do not find it attractive, because it is ending with just a fence of a harbour and the only way out is to take the same path back. It is hard to find another reason just to go there.

Compared to the literature can be said that visitors are more healthy when they spend more time in the blue area like the research site is. As the results of this thesis provide, there are more visitors in user group II, which means visitors are coming to do something in the park and compared with I group of users there are less visitors passing through. It means that in general people are spending longer time in the researched beach area. Based on literature it has better impact to their health than just walking through.

The overview of the literature leads to the hypothesis that visitors come to sense the closeness of the water. In other words to have a view to the sea. The method used in this work provides information only with heatmap and no personal opinion of the users. Conclusion from the heatmaps would be that people who pass the area as a traffic corridor often chose to go around the beach house where the view to the sea opens better than everywhere else on the asphalt road. All kinds of movement expressing activities are more intensive on the road closer to the coast and in some places the view to the water opens up. Extra high activity to open views appears on the standing activity map, where people seems to gather at the end of those short crossing asphalt roads. Sunbathing activity is very close to the sea, but probably the true reason is intensive sunlight on the sandy area.

The hypothesis is partly correct and partly wrong. Not all activities gather to the coast, but find suitable spots in the park. The heatmaps show that there are very few benches on the sand and those are often occupied, correlated to that the sitting activity might be forced to happen further from the water.

Based on the lack of activity in Kopli beach, the hypothesis that people visit the research area because of the closeness to the water was fully not proven, therefore it is not right nor wrong. Other aspects like unsafe atmosphere, lack of other visitors, the dead-end location must be considered. Based on the strolling activity can be guessed that visitors might feel

curious about the Kopli beach and during the observation time in three years the conditions there proved and number of visitors as well.

## Suitability of the method

Depend on the results the BBAT tool filled expectations and the user behaviour activity appeared clearly enough to make conclusions about the use of the park. I would suggest that it is suitable tool for using it in landscape architectures practice. The data gives a good overview about behavioural activity, therefore how people currently use the area. The outcome of the data shows general activity and conclusions about the landscape have be made based on the data. With the BBAT tool there will be no detailed information which aspects of design or details about facilities are needed, but an overview what might be needed in the park and why visitors come and what they seek for in the research area.

## Conclusion

The most popular activity was strolling. People engage in spending time in the park instead of rushing through. Popular places to stop are the places with a view to the water. This means that the biggest value of the research area is the coast with a possibility to sense the water. It still means that for activities which need extra design or facilities are spots in the park more attractive.

Design can support and invite people with areas where a visitor can stop for a moment without being on others way, connections with the rest of the city are very important how citizens enter and leave the site. Due to the mainly used access to the site the beach house surrounding has the highest intense of activities. All attractions are also around there, so the Kopli beach is very unused based on the results. Even if the Kopli beach actually has high recreational values as can be assumed based on the literature.

# Conclusion

Urban areas more often do not offer enough natural and healthy environment to citizens. Regardless of urban sprawl, designing and planning of blue spaces is not developing this fast. Modern citizens are spending less time in nature. The problem this thesis is trying to bring up is that unattractive park and its non-functional design is holding back the potential of green and blue space as a recreational area. There is not enough researches about behavioural activity in outdoor spaces. For the society this work is focusing on the blue space importance, the need to prevent health issues with planning.

The thesis´ research area Stroomi and Kopli beach is very special and valuable place to the whole city of Tallinn. The method used in this work is the BlueHealth Behavioural Assessment tool, shortly BBAT, is a systematic observation and recording method to provide the data about people´s behaviour and interacting activities on sites. The software that was used to collect and map the data is geographical information system QGIS (version 2.8.17). The BlueHealth pan-Europe project´s data from Tallinn is used to make analyses about behavioural activity in given research area.

During systematic on-site observations seasons, date and time of the day including weather variables with considerable change in weather conditions are recorded. The exact location, type of activity and demographic characteristics of the users are mapped with BBAT method.

First the age and gender information in six groups 1 (0-12 years old), 2 (13-20 years old), 3 (21-59 years old), 4 (over 60 years old) women and men. Plus social interaction information: were they alone, in pairs or in a group with three or more people together. Secondly the observer had to record the primary activity and secondary activities.

The BBAT method and outcome of it is a possible tool to use it for analysing a site in landscape architectures practice. One of the main questions was that is this method suitable for using in landscape architectures practice, does it gives an information about a place to create functional design? The user behaviour activity appeared clearly enough to make

conclusions about the use of the park. It gave an overview what might be needed in the park and why visitors come and what they seek for in the research area. It is suitable tool for using it in landscape architectures practice.

Regarding the behavioural activity, another question was raised – What kind of activities people engage in (and what is the proportion of different activities) and where they do it (what is the spatial distribution of the activities). Are there any general considerations for blue space design that can be suggested based on the analysis of this area (attractive details and aspects)?

For to find answers to raised questions the data was divided into two groups. First user group shows information with users who pass the area as a transit corridor. The second group includes visitors of the area, who came there to a destination point.

One of the hypothesis found a proof that strolling activity is the most intensive activity together with sitting which is on the second place. General considerations for blue space design is movement expressing activities need a chance to pass a circle shape trajectory and needed might be to create some sporty facilities to the north part of the park so they will offer a chance to do sport for more people at the same time.

Another hypothesis of this research was that attractive part of blue spaces are those areas where visitors can feel closeness with water and water is the main reason they visit the area. The hypothesis is partly correct and partly wrong. Not all activities gather to the coast, but find suitable spots in the park. The heatmaps show that there are very few benches on the sand and those are often occupied, correlated to that the sitting activity might be forced to happen further from the water. Can not be said that the hypothesis that people visit the research area because of the closeness to the water is wrong. Further researches in this topic would be needed.

The park is very one side oriented. The location of the research area in the city is not inviting people to pass through and for people who come from other directions of the city than Kopli peninsula the entrance to the research area is from the direction of the beach house. Kopli beach part has higher value based on the literature research. There is an opportunity to meet

wilderness and more diverse landscape. Visitors do not find it attractive, because it is ending with just a fence of a harbour and the only way out is to take the same path back.

As the results of this thesis provide, there are more visitors in user group II, which means visitors are coming to do something in the park and compared with I group of users there are less visitors passing through. It means that in general people are spending longer time in the researched beach area. Based on literature it has better impact to their health than just walking through.

The location of the research area in Stroomi and Kopli beach is not inviting people to pass through, but the area is working more like a destination point where to come with a purpose to walk and spent time outside. Conclude to this means that people generally are spending there more time and therefore having better health.

# Kokkuvõte

Linnapiirkonnad ei paku kodanikele piisavalt looduslikku ja tervislikku keskkonda. Sõltumata linnade laienemisest ei arene sinialade projekteerimine ja planeerimine samal kiirusel. Linnaelanikud veedavad looduses liiga vähe aega. Selle väitekirjaga püütakse tõstatada probleemi, et ebameeldiv park ja selle mittefunktsionaalne kujundus pärsivad rohelise ja sinise ruumi potentsiaali puhkealana. Väliruumis käitumise kaardistamise ja tegevuste kohta pole piisavalt uuringuid. Ühiskonna jaoks keskendub see töö sinialade tähtsusele ja vajadusele ennetada terviseprobleeme planeerimisega.

Lõputöö uurimispiirkond, Stroomi ja Kopli rand, on väga eriline ja väärtuslik koht kogu Tallinna linnale. Selles töös kasutatud meetod on BlueHealth Behavioral Assessment Tool, lühidalt BBAT, on süstemaatiline vaatlus- ja registreerimismeetod, mis kogub andmeid inimeste käitumise ja suhtlemise kohta ruumis. Andmete kogumiseks ja kaardistamiseks kasutatav tarkvara on geograafiline infosüsteem QGIS (versioon 2.8.17). BlueHealth üleeuroopalise projekti andmeid Tallinnast kasutatakse analüüsimiseks käitumistegevuse kohta antud uurimisvaldkonnas.

Kohapealsete süstemaatiliste vaatluste ajal registreeritakse aastaajad, kuupäev ja kellaaeg, sealhulgas ilmastikutingimuste oluliste muutustega ilmamuutujad. Kasutajate täpne asukoht, tegevuse tüüp ja demograafilised omadused on kaardistatud BBAT -meetodiga.

Esmalt märgiti teave vanuse ja soo kohta kuues rühmas 1 (0–12-aastased), 2 (13–20-aastased), 3 (21–59-aastased), 4 (üle 60-aastased) naised ja mehed. Lisaks sotsiaalse suhtluse teave: kas nad olid üksi, paarides või rühmas, kus oli kolm või enam inimest. Teiseks tuli vaatlejal registreerida esmane tegevus ja kõrval tegevus.

BBAT -meetod ja selle tulem on võimalik vahend kasutatamiseks analüüsi tegemiseks maastikuarhitektuuri praktikas. Üks põhiküsimusi oli, et kas see meetod sobib maastikuarhitektuuri praktikas kasutamiseks. Kasutajate käitumine ilmnes piisavalt selgelt, et teha järeldusi pargi kasutamise kohta.

Käitumusliku tegevuse osas tõstatati küsimus - milliste tegevustega inimesed tegelevad (ja milline on erinevate tegevuste osakaal) ja kus nad seda teevad (milline on tegevuste ruumiline jaotus). Kas siniala kujundamisel on üldisi kaalutlusi, mida saab selles valdkonnas analüüsi põhjal soovitada (atraktiivsed detailid ja aspektid)?

Tõstatatud küsimustele vastuste leidmiseks jagati andmed kahte rühma. Esimene kasutajate rühm näitab teavet kasutajatega, kes läbivad piirkonna transiidikoridorina. Teise rühma kuuluvad piirkonna külastajad, kes tulid sinna sihtpunkti pikemat aega veetma.

Üks hüpotees tõestas, et jalutuskäik on kõige intensiivsem tegevus koos istumisega, mis on teisel kohal. Sinialade kujundamise üldised kaalutlused on see, et liikumisega seotud tegevused vajavad võimalust läbida ringikujulist trajektoori ja võib -olla on vaja luua pargi põhjaossa mõned sportlikud rajatised, et need pakuksid võimaluse sportida rohkematele inimestele samal ajal.

Selle uuringu teine hüpotees oli, et sinialade atraktiivne osa on need piirkonnad, kus külastajad saavad tunda lähedust veega ja vesi on selle piirkonna külastamise peamine põhjus. Hüpotees on osaliselt õige ja osaliselt vale. Kõik tegevused ei kogune rannikule, kuid leiavad pargist sobivad kohad. Soojuskaardid näitavad, et liival on pinke väga vähe ja need on sageli hõivatud, mis on seotud sellega, et istuv tegevus on võib olla sunnitud toimuma veest kaugemal. Ei saa öelda, et hüpotees, et inimesed külastavad uurimispiirkonda vee läheduse tõttu, on vale. Selle teema kohta oleks vaja täiendavaid uuringuid.

Park on väga ühele osale orienteeritud. Uurimispiirkonna asukoht linnaruumis ei kutsu inimesi seda ala läbima ning inimestele, kes tulevad mujalt kui Kopli poolsaarest, on peamine ligipääs alale rannahoone suunast. Kopli rannaosas on kirjandusuuringute põhjal suurem tõenäosus mõjuda rekreatiivselt selle külastajatele. Külastajad siiski ei pea seda osa rannast kuigi atraktiivseks, see viib tupikusse, mis lõpeb sadama aiaga ja ainus väljapääs on minna sama rada tagasi.

Nagu käesoleva lõputöö tulemused näitavad, on II kasutajate rühmas rohkem külastajaid, mis tähendab, et külastajad tulevad parki midagi tegema. See tähendab, et üldiselt veedavad inimesed uuritud rannaalal kauem aega. Kirjanduse põhjal on need kasutajad parema

tervisega, kes veedavad välialadel rohkem aega. See mõjutab nende tervist paremini kui lihtsalt läbi ruttamine.

Uurimispiirkonna asukoht Stroomi ja Kopli rannas ei soosi, et inimesed kasutaksid seda ala läbitava paigana, vaid piirkond toimib pigem sihtpunktina, kuhu tulla eesmärgiga jalutada ja veeta aega väljas. Selline järeldus tähendab, et inimesed veedavad seal tavaliselt rohkem aega ja neil on seetõttu hinnanguliselt parem tervis kui neil, kes vaid liiguvad peatumata läbi väliala.

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